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10/31/00 jc821 U.S. PTO

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attorney Docket No.	**191406-1010**
First Named Inventor	**Stephens, Jr.**
Title	**SYSTEM AND METHOD FOR SECURE MANAGEMENT OF REMOTE SYSTEMS**
Express Mail Label No.	**EL492180647US**

10/31/00 JC922 U.S. PTO 09/702483

APPLICATION ELEMENTS

See MPEP Chapter 600 concerning utility patent application contents

ADDRESS TO: **Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231**

1. [X] *Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original, and a duplicate for fee processing)*
2. [ ] Applicant claims small entity status
3. [X] Specification *(preferred arrangement set forth below)* [Total Pages **32**]
   - Descriptive title of the invention
   - Cross References to Related Applications
   - Statement Regarding Fed Sponsored R&D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [X] Drawing(s) *(35 USC d113)* [Total Sheets **18**]
5. Oath or Declaration [Total Pages]
   a. [ ] Newly Executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR §1.63(d)) *(for continuation/divisional with Box 17 completed)*
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR §1.63(d)(2) and 1.33(b).
6. [ ] Application Data Sheet See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Copy (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies), or
      ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & Documents(s))
10. [ ] 37 CFR §3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [X] Other: **Unexecuted Declarations of: D.G. Stephens, Jr.; Edwin Powali; and S. Lombard**

17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information below and in a preliminary amendment, OR IN AN Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: / .

Prior application information: ***Examiner*** _____ ***Group / Art Unit:*** _____

For CONTINUATION OR DIVISIONAL APPS only the entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference This incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts

18. CORRESPONDENCE ADDRESS

[X] *Customer Number or Bar Code Label* **24504** *(Insert Customer No. or Attach bar code label here)* *or* [ ] *Correspondence address below*

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Name (Print/Type)	**Jeffrey R. Kuester**	*Registration No. (Attorney/Agent)*	**34,367**
Signature		*Date*	10/31/00

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FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision

TOTAL AMOUNT OF PAYMENT | ($) 1348.00

Complete If Known	
Application Number	
Filing Date	October 31, 2000
First Named Inventor	Stephens, Daniel G., Jr.
Examiner Name	
Group / Art Unit	
Attorney Docket No.	191406-1010

METHOD OF PAYMENT

1. ☒ The Commissioner is hereby authorized to charge to the following Deposit Account,

Deposit Account Number: 20-0778

Deposit Account Name: Thomas, Kayden, Horstemeyer Risley

☐ Charge all indicated fees and any additional fee required or credit any overpayment.

☒ Charge any additional fee required and requested to credit any overpayment.

☐ Applicant claims small entity status See 37 CFR 1.27

2. ☒ **Payment Enclosed:**

☐ Check ☐ Money Order ☒ Credit Card

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
101	710	201	355	Utility filing fee	$710
106	320	206	160	Design filing fee	$
107	490	207	245	Plant filing fee	$
108	710	208	355	Reissue filing fee	$
114	150	214	75	Provisional filing fee	$

SUBTOTAL (1) ($)710

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below		Fee Paid
Total Claims	51	-20**=	31	x	18.00	=	558
Independent Claims	4	-3** =	1	x	80.00	=	80
Multiple Dependent					270.00	=	0

**or number previously paid, if greater, For Reissue, see below

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent Claims in excess of 3
104	260	204	130	Multiple dependent claims in excess of 3
109	78	209	39	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)638

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension of time within second month	
117	890	217	445	Extension of time within third month	
118	1,390	218	695	Extension of time within fourth month	
128	1,890	228	945	Extension of time within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a pubic use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,240	241	620	Petition to revive - unintentional	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (time number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR 1 129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR 1 129(b))	
179	710	279	355	Request for Continued Examination (RCE)	
169	900	169	9000	Request for expedited examination of a design application	

Other fee (specify) _____

Other fee (specify) _____

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SUBTOTAL (3) 0

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	Jeffrey R. Kuester			Reg Number	34,367
Signature		Date	10/31/00	Deposit Account User ID	

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PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

jc922 U.S. PTO
09/702483
10/31/00

In re: Stephens, et al.

For: SYSTEM AND METHOD FOR SECURE MANAGEMENT OF REMOTE SYSTEMS

CERTIFICATE OF EXPRESS MAIL

Assistant Commissioner for Patents
BOX: Patent Application
Washington, D.C. 20231

Sir:

Enclosed for filing in the above case are the following documents:

Return Postcard
Specification (24 pages)
Claims 1-51 (7 pages)
Abstract (1 page)
Drawings - Figs. 1-12 (18 pages)
Utility Application Transmittal (in duplicate)
Fee Transmittal
Credit Card Payment Form
Unsigned Declarations of: Daniel Guy Stephens, Jr., Edwin Powali, and Stephen Lombard

Further, the Commissioner is authorized to charge Deposit Account No. 20-0778 for any additional fees required. The Commissioner is requested to credit any excess fee paid to Deposit Account No. 20-0778.

Respectfully submitted,

Jeffrey R. Kuester; Reg. No. 34,367

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.
100 Galleria Parkway, N.W.
Suite 1750
Atlanta, Georgia 30339-5948

Our Docket No: **191406-1010**

I hereby certify that all correspondences listed above are being deposited for delivery to the above addressee, with the United States Postal Service **"EXPRESS MAIL POST OFFICE TO ADDRESSEE"** service under 37 CFR §1.10 on the date indicated below:

The envelope has been given U.S. Postal Service "Express Mail Post Office To Addressee" Package # **EL492180647US**.

Date: 10/31/00

Jeffrey R. Kuester

SYSTEM AND METHOD FOR SECURE MANAGEMENT OF REMOTE SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/211,399, filed June 14, 2000, which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The present disclosure relates generally to the management of computer systems. More particularly, the disclosure relates to a secure method and system for remote management and monitoring of network devices.

BACKGROUND OF THE INVENTION

Typically, the hardware and software setup of a computer system is determined by a collection of related and unrelated files and directories having various parameters related to the assortment of components that make up the computer system. During the installation of a new device or program, the computer needs to be manually or automatically reconfigured to accommodate the new device or program. For example, when installing a new hard drive onto the system, pertinent information about capacity, brand and how it is connected must be available to the operating system to make internal decisions for proper access. Similarly, when new software is installed onto the system, pertinent information must be available to the new software to make internal decisions to properly run the newly installed program and not impact the current environment. The configuration information for hardware and software is typically stored in one or more configuration files. Typically, during the initialization of the operating system program and at the start of additional programs; the programs will access their assigned configuration files to retrieve values to be used by the programs for parameters that may vary from computer to computer depending on the environment and user preferences. This allows for the proper functioning of devices and programs to work together on a computer system. This dynamic configuration capability enables a wide combination of devices and software to work together and be well behaved.

Similar to individual computer systems, one or more configuration files are needed to control computer networks. These are after all typically just a specialized combination of an operating system, devices and programs. A local area network (LAN) typically consists of several individual computers connected to each other over a communications connection. Similar to how an individual computer system needs information on various devices and programs in order to function properly, LAN servers need information on the various individual computers on the network in order for those individual computers to function properly and be well behaved while connected. As new computers are added to the network, reconfiguration of the network server may be necessary. For example, if a new workstation were added to a LAN, the network server would need the address of the workstation (i.e., information on how to access that workstation) in order to route the new workstation messages and requests correctly to communicate with other devices on the network. Similarly, if a new printer were added to the network, the network server would need information about the new printer in order to have proper access to the printer by other devices on the network (i.e., access by the workstations on the network.

A gateway server often includes hardware and software for connecting LANs to the IInternet. Similar to network servers, gateway servers need to be correctly configured in order to have proper functioning of the LAN vis-à-vis the Internet. The necessary information for configuring a gateway server is often contained in a configuration file for the gateway server. Since the gateway server acts as an interface between the LAN and the Internet, it is imperative that these gateway servers are properly monitored and managed. Illustrative of the importance of gateway servers, if a gateway server malfunctions, then it is possible that the entire LAN may be denied access to the Internet or permit unauthorized access to the gateway server and/or LAN. Moreover, since the gateway server is the LAN's connection to the "outside world," if a particular gateway server is compromised, then individual systems on the LAN connected to the gateway server are susceptible to tampering. Likewise, in wide area networks (WAN) having multiple gateway servers, a compromise of one gateway server may risk compromise of other gateways in the WAN.

Historically, managing gateway servers required accessing each gateway server's

configuration file using a proprietary interface and manually typing in countless parameter values. Once the gateway server is operational, should reconfiguration be necessary or desired, that gateway server's configuration interface must be accessed again, and the required configuration changes applied. In order to do this securely, the administrator would have to, either, be physically present at the location of the gateway server, or have access to the unit's configuration interface via a secure channel. Moreover, if multiple gateway servers need simultaneous reconfiguring, which is often the case for multiple gateway servers managed by the same organization, the administrator would need to access each unit's configuration interface in turn to make changes to each individual unit. This makes for reconfiguration of gateway servers difficult and time consuming.

Alternatively, methods of allowing pre-configuration scripts to be backed up from one unit and applied to another via means such as file transfer protocol (FTP) are among other methods of remote configuration. These remote management methods have traditionally required each unit to monitor all incoming messages and respond to incoming requests for reconfiguration from an off-site administration machine. Such a method requires that each gateway server maintain an open port for incoming requests, thus, rendering each unit vulnerable to an attack by a hacker (e.g., denial of service attacks). This problem becomes accentuated in the context of configuration files as a system's resources may become consumed in identifying and attempting to configure a device before the system realizes that it has an incorrect or corrupt configuration data. In addition, the conventional simple network management protocol (SNMP) system has often been used for configuration management. SNMP, however, suffers from being so difficult to configure and maintain that it is often improperly set up, poorly maintained, or ultimately neglected to the point that it becomes a security risk.

From the foregoing, it can be appreciated that there is a need in the art for a method and system for remotely managing networked devices in the hostile Internet environment without sacrificing security.

SUMMARY OF THE INVENTION

The present disclosure relates to a method and system for securely managing remote

networked devices, one non-limiting example being gateway servers. Unlike previous methods of managing remote devices where an administration system "pushes" commands or files to a remote device, the preferred embodiment of the present invention provides a method where the remote devices automatically "pull" pertinent information from a secure source, preferably other than an administration system, which provides for greater security in managing and monitoring the remote devices.

In one implementation, the system of the preferred embodiment of the present invention includes an administration system that securely forwards configuration information to a staging platform (e.g., a mail server) for subsequent retrieval by remote network devices (e.g., gateway servers, automatic teller machines, etc.) that poll the staging platform for configuration information in a defined manner and automatically reconfigure according to the configuration information and secured processes.

The features and advantages of the invention will become apparent upon reading the following detailed description, when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The system and method for remote configuration and monitoring of gateway sites can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention.

FIG. 1A is a block diagram illustrating the relationship between an administration site, a mail server, and a gateway site in an embodiment of the system.

FIG. 1B is a block diagram illustrating an embodiment of the invention for a plurality of gateway sites.

FIG. 2 is a block diagram showing an exploded view of the administration site of FIG. 1B.

FIG. 3A is a diagram illustrating example configuration data.

FIG. 3B is a block diagram showing an exploded view of the administration system of FIG. 2 having a direct input mechanism for entering the configuration data of FIG. 3A.

FIG. 3C is a block diagram showing an exploded view of the administration system of FIG. 2 having a remote input mechanism for entering the configuration data of FIG. 3A.

FIG. 4 is a block diagram showing an exploded view of portions of the administration system of FIG. 2 configured to encrypt and transmit the configuration data of FIG. 3A.

FIG. 5 is a block diagram showing an exploded view of the transmission path of the encrypted configuration data between the administration site and the mail server of FIG. 1B.

FIG. 6 is a block diagram showing an exploded view of the retrieval path of the encrypted configuration data between the mail server and the gateway site of FIG. 1B.

FIG. 7A is a block diagram showing an exploded view of the gateway server of FIG. 6 configured to retrieve the encrypted configuration data from the mail server.

FIG. 7B is a block diagram showing an exploded view of portions of the gateway server of FIG. 6 configured to decrypt the encrypted configuration data.

FIG. 7C is a block diagram illustrating the reconfiguration of the gateway server of FIG. 6 according to the configuration data of FIG. 3A.

FIG. 8 is a block diagram illustrating the reconfiguration of local area network personal computers in accordance with the reconfiguration of the gateway server in FIG. 7C.

FIG. 9 is a flow chart illustrating portions of an example method implemented by the system of FIGS. 6, 7A, 7B, and 7C.

FIG. 10 is a flow chart illustrating the file retrieval step of FIG. 9 in more detail.

FIG. 11A is a flow chart illustrating the file-processing step of FIG. 9 in more detail.

FIG. 11B is a flow chart illustrating the method of confirming correct installation by the administration machine.

FIG. 12 is a flow chart illustrating one portion of a method of monitoring remote gateway sites.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Previous methods of managing and monitoring remote gateway servers used a "push" method of administration. In other words, an administration machine, which was responsible for the administration of remote gateway servers, would reconfigure each gateway server by

remotely accessing each unit and "pushing" configuration data to each unit (i.e., sending or writing new configuration data onto the gateway server). Those "push" methods would require each gateway server to monitor and respond to incoming requests for reconfiguration from an off-site administration machine, thus, requiring each unit to maintain an open port for incoming requests. Those open ports would render each unit vulnerable to an attack by a hacker (e.g., denial of service attacks). In contrast to that "push" method, a "pull" method, as described by this disclosure, would allow for remote management of gateway servers without the compromised security inherent in traditional "push" methods. While particular embodiments of the invention will be disclosed, it will be understood by those skilled in the art that variations and modifications thereof can be made without departing from the scope of the invention as set forth.

Referring now in more detail to the drawings, in which like numerals indicate corresponding parts throughout the several views, FIG. 1A is a block diagram illustrating an overview of the system 100 having an administration site 110, a mail server 135, and a gateway site 150 in a remote configuration and remote monitoring system. The system can be seen as having three main components that are connected to one another through communications pathways. The administration site 110, which is responsible for the administration of a gateway site 150, is connected to that gateway site 150 through a communications pathway 170. In a typical "push" system of administration, the administration site 110 would have direct access to the gateway site 150, thus, allowing the administration site 110 to directly transfer (or "push") configuration information from the administration site 110 to the gateway site 150 through the communications pathway 170. As mentioned above, this requires the gateway site 150 to maintain an open port, which grants access to the administration site 110 as well as potentially opening up the gateway site 150 to potential hackers. The administration site 110 is also connected to a mail server 135 on the Internet 130 through a communications pathway 120. Furthermore, the mail server 135 is accessible to the gateway site 150 through a communications pathway 140.

Generally, in the preferred embodiment of the invention, the administration site 110 places configuration data on the mail server 135 for retrieval by the gateway site 150 through a communications pathway 140. Since the gateway site is "pulling" (rather than "pushing") the

configuration data from the mail server 135 according to a defined schedule, no open port is required as in previous methods and, therefore, the system is less vulnerable to penetration from hackers or other unwanted intruders. Also, if, though not the case in all embodiments, the mail server 135 is a publicly accessible mail server, such as those available through "hotmail" or "yahoo," then the configuration data may be available to the gateway site 150 through a simple mail transfer protocol (SMTP). The advantage to using SMTP is that, not only is SMTP simple to setup and operate, the worldwide SMTP system has numerous failsafe and failover processes, thus ensuring storage and delivery of email with a reduced risk of down time. Thus, this system provides a method for reliably configuring remote devices.

The system of FIG. 1A also preferably provides a method for monitoring a gateway site. The communications pathway 170 is now used as a "checksum" or "heartbeat" pathway, which allows the gateway site 150 to periodically transmit a user datagram protocol (UDP) packet to the administration site 110 to indicate the active status of the gateway site 150. A failure to receive a schedule UDP packet preferably causes a monitoring process in the administration site 110 to generate an alarm to notify appropriate personnel that the gateway site 150 is possibly inactive. In one embodiment, an encrypted socket connection is used to push current status information up to the administration site 110. In addition, since both the gateway site 150 and the administration site 110 are connected to the mail server 135 on the Internet 110, SMTP may also be used to monitor the gateway site 150 by the administration site 110. In the preferred embodiment, email messages are also periodically transmitted from the gateway site 150, preferably through the mail server 135, to the administration site 110 to confirm that the gateway site 150 is operating with the correct configuration information. Of course, other embodiments are included within the scope of the present invention that do not include one or more of these monitoring mechanisms.

FIG. 1B is a block diagram illustrating the remote configuration and monitoring system 100 for a plurality of gateway sites 150(0 . . . n). It is often the case where an administration site 110 is responsible for monitoring and managing a plurality of gateway sites 150(0 . . . n). In these circumstances, the administration site 110 often desires concurrent reconfiguration (i.e., reconfiguration at approximately the same time) of the gateway sites 150(0 . . . n). Historically, in prior systems, in order for the administration site 110 to reconfigure each gateway site 150(0 . .

. n), the administration site 110 would have to directly access each individual gateway site 150(0 . . . n) and reconfigure each gateway site 150(0 . . . n) individually. As shown in FIG. 1B, the system of storing configuration data on a mail server 135 on the Internet 130 allows each gateway site 150(0 . . . n) to access the mail server 135 through a communications pathway 140(0 . . . n), thus, allowing for concurrent reconfiguration of a plurality of gateway sites 150(0 . . . n). Also, since there are no ports left open at any of the individual gateway sites 150(0 . . . n), the system is less vulnerable to intrusion by hackers. Moreover, since all gateway sites 150(0 . . . n) and the administration site 110 are on the Internet, a UDP packet may be transmitted directly from the gateway sites 150(0 . . . n) to the administration site 110 through the Internet 130.

Although the mail server 135 and the administration site 110 are depicted separately in FIGS. 1A and 1B, in another embodiment of the invention, the mail server 135 may be located at the administration site 110 as an integrated portion of the administration site 110. Regardless of whether or not the mail server 135 and the administration site 110 are integrated, the polling of the mail server 135 by the gateway site 150 allows for greater security because there is now no need for the gateway site 150 to keep a port open. In addition, other embodiments of the present invention also include separating from the administration site 110 into a separate site one or more of the monitoring functions discussed above.

FIG. 2 is a block diagram showing an exploded view of the administration site 110 of FIG. 1B. An administration site may be a local area network (LAN) having an administration machine 210 connected to a plurality of workstations 220(0 . . . n) through LAN interfaces 225(0 . . . n). Typically, the LAN is located behind a firewall 230, which protects the LAN from unauthorized access by allowing only authorized information to pass the firewall 230 through a communications pathway 120, and denying unauthorized information 260 from penetrating the firewall 230. Within the LAN, each local workstation 220(0 . . . n) freely communicates with the other workstations 220(0 . . . n) on that LAN as well as with the administration machine 210. This allows for administration of the LAN from any of the workstations 220(0 . . . n) on the administration site 110 LAN. Although a plurality of workstations 220(0 . . . n) is shown in this example, it will be clear to one of ordinary skill in the art that the administration site 110 may comprise only the administration machine 210, or any combination of workstations and the

administration machine. Moreover, it will be clear to one of ordinary skill in the art that, while an external firewall 230 is shown for illustrative purposes, the administration machine 210 may comprise an internal firewall or other similar security measure for preventing access to the administration site by intruders. Also, a workstation 220(i) may be configured as the mail server 135 (FIG. 1B), thus, integrating the mail server 135 (FIG. 1B) into the administration site 110 as mentioned in connection with FIGS. 1A and 1B.

FIG. 3A is a diagram illustrating portions of an example configuration data 301. Gateway sites 150(0 . . . n) (FIG. 1B) often include gateway servers with hardware and software for connecting LANs and workstations to the Internet 130 (FIG. 1B). These gateway servers need to be correctly configured in order to ensure proper functioning of the LANs vis-à-vis the Internet. Information for configuring a gateway server is contained in configuration data 301 for the gateway server. The example configuration data 301 shows a file (or other data structure in other embodiments) having configuration information regarding administration and gateway functions. The importance of this configuration information will become apparent below during the discussion of the installation of portions of the configuration data 301 onto the gateway servers (FIG. 7C, later discussed). The administration machine 210 (FIG. 2) may reconfigure host information, device setup, firewall filters and definitions, email settings, and other parameters of the gateway servers. For example, the following list includes Unix services and processes, as would be understood by one reasonably skilled in the art of the present invention, that are configured in one implementation of the preferred embodiment of the present invention: sendmail and mail archive; fetchmail; Apache web cache; Squid web cache; Samba file sharing; DNS and bind; ipfilter firewall rules; ipnat ip address redirection; ipconfig set ip address and hostnames; route manage routes; web access control; add users, groups, mail; VPN ip tunneling, intrusion detection sub-system. Another grouping of such information in one implementation includes: ip filter rules, hostname, intrusion detection, ethernet ipaddress netmask, unix users, mail server, route data, and device type. Still another grouping could include information describing the hostname of the gateway machine, local data and time information, information describing each network interface, information with respect to domain name system configuration, information governing the routing of network information between network

interfaces, information governing the configuration of machines connected to the protected local area network, information governing firewalls and other security information, information governing web access control, information governing the configuration of a mail server, information governing users and groups, information governing file sharing, information governing virtual private networking and other information concerning the services and configuration of the gateway machine. Although an example of configuration data is included in the provisional application incorporated by referenced above, it will be clear to one of ordinary skill in the art that the configuration data may be modified to, either, contain other information pertinent to the operation of a gateway server, or remove certain configuration information, without affecting the essence of the invention. In addition, for network devices other than gateway servers, configuration information can include other types of configuration information known to be used in configuring such devices. Furthermore, select types of data, as opposed to configuration information, may also be transferred through the polling techniques disclosed herein.

Once the information for configuration data 301 (FIG. 3A) is determined by an administrator, this configuration data may be input to the administration machine 210 (FIG. 2) directly or indirectly. FIG. 3B is a block diagram showing an exploded view of the administration system of FIG. 2 having a direct input mechanism for entering the configuration data of FIG. 3A. In one implementation, the administrator would input the configuration data 301 to the administration machine 210 through an input device 332 (e.g., keyboard), and the configuration data 301 would be transferred through a local interface 312 to be stored on a storage device 322 (e.g., hard disk, floppy disk, CD-ROM, etc.) in a larger database or data structure with multiple other instances or "database records" of configuration data 301 specific to other gateway sites 150(0. . . n). Of course, programming contained in memory 362, preferably loaded from storage device 322, would be executed by a processor 302 to facilitate the entry and storage of the configuration data 301, including a graphical user interface displayed on a display 342 in one implementation. A template is provided and maintained for each gateway site 150(0. . . n), into which an administrator is able to enter configuration information and settings. Additional programming provides the other functions discussed herein, but other embodiments

include additional processors and data storage devices for implementing one or more of the functions described herein. It should be understood, however, that one or more of the functions described herein are omitted in other embodiments of the present invention. Furthermore, the user interface provided to an administrator from the administration machine 210 would preferably be similar to a user interface that would be provided directly at a gateway site 150, except for additional functionality needed at the administration machine 210 to manage multiple instances of configuration data 301. As discussed below, a network interface 372 connects the administration machine 210 to other networks, such as the Internet 130 (FIG. 1A), for sending and receiving electronic mail, as well as receiving the UDP packets discussed above, and a remote configuration port 352 can be used as discussed below.

In addition, FIG. 3C shows an exploded view of the administration machine 210 of FIG. 2 having a remote input mechanism for entering the configuration data of FIG. 3A. If the administrator is not physically located at the administration machine 210, the administrator may input the configuration data 301 into the administration machine 210 from a workstation 220(i) on the LAN of the administration site 110 (FIG. 1B). Here, the remote workstation 220(i) is connected to a remote configuration port 352 of the administration machine 210 through a LAN interface 225(i). The remote configuration port 352 of the administration machine 210 receives the configuration data 301 from the workstation 220(i) through a LAN interface 225(i) and stores the configuration data 301 onto storage device 322 on the administration machine 210. Other embodiments also includes providing the functions of the administrative machine 210 in alternate arrangements of hardware. In addition, it is understood that there are many ways of getting configuration information into the configuration data 301, including others not shown in the figures, such as through a remote workstation connected through the network interface 372.

Regardless of whether the configuration data 301 is input directly (e.g., FIG. 3B) or indirectly (e.g., FIG. 3C) to the administration machine 210, once the administration machine 210 is ready to reconfigure remote gateway sites 150(0 . . . n) (FIG. 1B), the configuration data 301 needs to be securely placed on a remote mail server 130 (FIG. 1B) for access by the remote gateway sites 150(0 . . . n) (FIG. 1B). FIG. 4 is a block diagram showing an exploded view of portions of the administration system 210 illustrating how it is configured to encrypt and transmit

the configuration data 301. The processor 302 on the administration machine 210 accesses the storage device 322 of the administration machine 210 through a local interface 312. The processor 302 retrieves the configuration data 301 from the storage device 322 and encrypts the configuration data 301 to produce an encrypted file 401 for transmission through the network interface 372. While not illustrated explicitly, the encrypted file 401 may be saved on the storage device 322 before being transmitted through the network interface 372.

Although certain encryption techniques are referenced below in accordance with the preferred embodiment of the present invention, it will be clear to one of ordinary skill in the art that inventive aspects of the present invention do not lie in the particular algorithm used to encrypt the configuration data 301. Moreover, since symmetric key encryption/decryption techniques (e.g., the conventional blowfish algorithm) as well as asymmetric key encryption/decryption techniques (e.g., PGP) are well known in the art, such techniques will not be discussed in detail. Suffice it to say that most encryption techniques may be used to encrypt the configuration data 301 to produce the encrypted file 401. In an example encryption of the configuration data 301, the processor 302 determines the recipient of the file 401 and, using a secure hashing algorithm such as a message digest algorithm (MD-5), hashes together recipient identification information (e.g., gateway device serial number) and a password. The result of that hashing is then used as an encryption key in the blowfish algorithm to create an encrypted version of the configuration data 301, which is then preferably conventionally UUencoded to create the (uuencoded) encrypted file 401 and is transmitted through the network interface 372 as part of an SMTP email message created and addressed to a particular gateway site 150(0. . . n) by the administration machine 210. Of course, other embodiments of the present invention include virtually any method of transmitting the information in configuration data 301, or other information on administration site 110, through the various polling techniques disclosed herein.

FIG. 5 is a block diagram showing an exploded view of the transmission path of the encrypted file 401 (and encapsulating email message) between the administration site 110 (FIG. 1B) and the mail server 135 (FIG. 1B). In this embodiment, the mail server 130 (FIG. 1B) is located separately from the administration site 110 (FIG. 1B). Once the processor 302 (FIG. 4) encrypts the file and determines the address of the recipient, the encrypted file 401 is transmitted

from the administration machine 210 to the mail server 135 via a communications pathway 120. The mail server 135 stores the encrypted configuration data 401 as part of an email message, which is now ready for retrieval, such as through a conventional post office protocol (POP). As shown by FIG. 5, since the encrypted file 401 is transmitted from the administration machine 210 to the mail server 135 through the firewall 230, no entry path to the administration site 110 is created through the firewall 230 via this path during this time. Hence, the administration site 110 is secure from potential infiltration by undesired intruders (i.e., hackers). Also, since the encrypted file 401 on the mail server 135 is both recipient specific (i.e., the file is addressed to a specific recipient) and encrypted, the encrypted file 401 is secure from unauthorized access from the mail server 135 until retrieved by the intended recipient (i.e., the gateway server(s) for which the file was intended). Of course, the firewall 230 may be omitted in some embodiments or incorporated into the administration machine 210.

FIG. 6 is a block diagram showing an exploded view of the retrieval path of the encrypted file 401 once the encrypted file 401 is placed on the mail server 135 by the administration machine 210 (FIG. 5). As discussed in more detail below, a gateway server 610 at the gateway site 150 polls the mail server 135 to determine whether there is a file for that gateway server 610 from the administration machine 210 on the mail server 135 (i.e., whether there is an email for the gateway server from the administrator). Depending on the desired level of security, the mail server 135 may be polled after initialization at irregularly scheduled or evenly spaced periodic intervals (e.g., every 10 minutes), as well as according to other arrangements as necessary, including at initialization, etc. If the gateway server 610 determines that an encrypted file 401 on the mail server 135 is intended for that gateway server 610, then the gateway server 610 retrieves the encrypted file 401 through a communications pathway 140(i) between the mail server 135 and the gateway server 610. As shown in FIG. 6, since the gateway server 610 "pulls" a file (i.e., retrieves an encrypted configuration file 401) from the mail server 135, rather than having the file "pushed" to the gateway server 610, there are no open ports which are left vulnerable to attacks by hackers (e.g., denial of service attacks). The remaining elements of FIG. 6 are discussed in more detail in reference to FIG. 8 below.

In architecture, the gateway server 610 may also include a firewall (not shown). The

firewall may be external to the gateway server 610 or, alternatively, internal to the gateway server 610 as an integrated portion of the gateway server 610. In the embodiment having a firewall, the retrieval of the encrypted file 401 would be shielded by the firewall of the gateway server 610. This would allow only authorized exchanges to take place through the firewall, thus, further securing the gateway site 150(i) from unwanted intruders.

FIG. 7A is a block diagram showing an exploded view of elements of the gateway server 610 of FIG. 6 configured to retrieve the encrypted file 401 (and associated email message) from the mail server 135. A preferred embodiment of the gateway server may comprise, in one embodiment, a network interface 772 (i.e., communications hardware), a high performance processor 702, a storage device 722, a web server 732, a filter 742 (e.g., security measures), a local mail server 762, and an administrative interface 752. Although not shown in FIG. 7A, the gateway server 610 may further comprise a hardware dongle (i.e., a gateway server identification device), which may also be used as an access control device and may include the serial number for the gateway server 610 discussed above with respect to the MD-5 hashing function. In one embodiment, each gateway server includes high performance processing and communications hardware, a Web server, a mail server, stateful observation packet filtering and proxies for robust security, a Web-based administrative interface accessible from the protected LAN, and caching for both the Web server and DNS server, providing faster access to the Internet. Once the gateway server 610 polls the mail server 135 (FIG. 6) and determines that there is an encrypted file 401 from the administration machine 210 (FIG. 2), the encrypted file 401 is retrieved from the mail server 135 by the gateway server 610 through a network interface 772 connected to the communications pathway 140(i). The encrypted file 401 is then stored at a storage device 772 on the gateway server 610 and is ready for decrypting and potentially installing, as discussed in more detail below.

FIG. 7B is a block diagram showing an exploded view of portions of the gateway server 610 of FIG. 6 configured to decrypt the encrypted file 401. The encrypted file 401 is accessed by a processor 702 via a local interface 712. As discussed in more detail below, the processor 702 UUdecodes the file to convert the ASCII text back to binary. During the UUdecode process, the processor checks for the end-of-file (EOF) marker to make sure that the complete file 401 has

been retrieved, and if the complete file has been retrieved, the gateway server 610 further checks to ensure that the result of the UUdecoding is the correct file. If the complete encrypted file 401 is not the correct file, the gateway server 610 sends a message to the administration machine 210 (FIG. 2) alerting the administration machine 210 (FIG. 2) that the wrong file has been received by the gateway server 610. Once it has determined that the complete (and correct) file 401 has been retrieved, the processor 702, then, decrypts the encrypted file 401 using the appropriate decryption algorithm to produce decrypted configuration data 301. Since symmetric key encryption/decryption techniques (e.g., blowfish algorithm) as well as asymmetric key encryption/decryption techniques (e.g., PGP) are well known in the art, such techniques will not be discussed further. Suffice it to say that whichever encryption technique was used to encrypt the configuration data 301 (FIG. 4), the corresponding decryption technique is used here by the processor 702 to decrypt the encrypted file 401 to produce the decrypted configuration data 301. This decrypted configuration data 301 is then stored on the storage device 722 of the gateway server 610. Upon successful decryption of the encrypted file 401, including authenticating that the message is from the administration machine 210 (FIG. 2), the gateway server 610 is configured to notify the administration machine 210 (FIG. 2) of successful decryption. Alternatively, if decryption is unsuccessful, the gateway server 610 is configured to notify the administration machine 210 (FIG. 2) of unsuccessful decryption. In addition, as further discussed below, the gateway server 610 also notifies the administration machine 210 (FIG. 2) if the received configuration data 301 does not contain the correct data corresponding to that type of gateway server 610.

FIG. 7C is a block diagram illustrating the reconfiguration of the gateway server of FIG. 6 according to the configuration data of FIG. 3A (though only a portion of the example data categories are shown in FIG. 7C). As mentioned above in FIG. 3A, the information in the configuration data 301 determines the setting of various parameters for the proper functioning of the gateway server 601 vis-à-vis the Internet 130, in the preferred embodiment. Once the decrypted configuration data 301 provides the relevant information to the gateway server 610, the gateway server 610 reconfigures its system settings in accordance with the information in the configuration data 301. The importance of resetting certain configuration parameters is that,

when the administration machine 210 (FIG. 2) becomes aware of a security breach, one way to remedy the breach is by reconfiguring the gateway server 610. For example, if the administration machine 210 (FIG. 1B) is aware of a firewall 630 (FIG. 6) breach at a gateway site 150(i) (FIG. 1B), the administration machine 210 (FIG. 1B) may redefine firewall rules to remedy that breach. Also, in order to increase security, the administration machine 210 (FIG. 1B) may routinely reconfigure each unit's parameters such as, but not limited to, host information, device setup parameters, file sharing protocols, as well as a plethora of other parameters (see, for example, FIG. 3A and APPENDIX A of the provisional application incorporated by reference above). By routinely (or periodically) changing these parameters, the administration machine 210 (FIG. 1B) decreases security risks associated with the gateway server 610 (FIG. 6). It will be clear to one of ordinary skill in the art that the example configuration information in the incorporated data is not intended to limit the invention to only those parameters included in the example data. To the contrary, it is intended that, among other data, all parameters related to configuration (or reconfiguration) be included in the scope of the present invention. Continuing, once the gateway server 610 is reconfigured according to the parameters in the configuration data 301, the gateway server 610 notifies the administration machine 210 (FIG. 2) of the successful reconfiguration. Alternatively, if reconfiguration is unsuccessful, the gateway server 610 notifies the administration machine 210 (FIG. 2) of unsuccessful reconfiguration. In essence, the "pull" system embodied by this invention is configured to apprise the administration machine 210 (FIG. 2) of the status of retrieval (FIGS. 6 and 7A), decryption (FIG. 7B), and reconfiguration (FIG. 7C) of the gateway server 610.

Once the gateway server 610 is reconfigured, further reconfiguration of personal computers (PC) 820(0 . . . n) at the gateway site 150(i) may be desired. FIG. 8 is a block diagram illustrating the reconfiguration of LAN-PCs 820(0 . . . n) in accordance with the reconfiguration of the gateway server 610. If the information in the configuration data 301 is pertinent to the operation of the LAN (i.e., the gateway site 150(i) (FIG. 1B)), then the configuration data 301 (or a portion thereof) is transmitted from the gateway server 610 to the LAN-PCs 820(0 . . . n) in order for the individual LAN-PCs 820(0 . . . n) to be reconfigured accordingly. As shown from FIGS. 1A through 8, the system of the present invention 100 (FIG. 1B) allows for secure

management and monitoring of remote gateway sites 150(0 . . . n) (FIG. 1B) by an administration site 110 (FIG. 1B). Since the system allows for a "pulling" (rather than a "pushing") of configuration information, much of the security risks associated with traditional methods of reconfiguring remote gateway sites is eliminated.

In addition to the system (as described above), a method for securely managing and monitoring remote gateway sites 150(0 . . . n) (FIG. 1B) by an administration site 110 (FIG. 1B) is taught. FIG. 9 is a flow chart illustrating portions of a method 900 implemented by the system 100 described in FIGS. 1A through 8. Broadly conceptualized, the method 900 may be separated into administration site method steps 901, which comprise steps taken by the administration site 110 (FIG. 1B), and gateway site method steps 902, which comprise steps taken by the gateway site 150(0 . . . n) (FIG. 1B). One embodiment of the administration site method steps 901 may be viewed as follows. First, the administration machine 210 (FIG. 2) creates or modifies, in step 905, configuration data 301 (FIG. 3A) as part of a larger configuration database and identifies a specific recipient (i.e., a gateway server 610 (FIG. 6)) to be reconfigured. As discussed above, in one implementation, step 905 takes place in conjunction with an administrator operating the administration machine 210 to edit configuration information for a gateway site 150(0 . . . n) (FIG. 1B) and initiate the update process. Next, the administration machine 210 (FIG. 2), in step 910, automatically creates one or more configuration files to include the configuration data 301 (FIG. 4) for that particular gateway site (150(0 . . .n) (FIG. 1B) , compresses the configuration data, and encrypts the compressed configuration data to produce an encrypted file 401 (FIG. 4). In one implementation, the configuration files that are compressed through one of a variety of conventional compression algorithms include a dump file from the larger configuration database for a particular gateway site 150(0 . . . n) and a key file that are joined together before compression, such as through the common TAR (tape archive) Unix utility process. Of course, additional files could also be included in the joining process. In step 910, gateway server identification information (e.g., serial number of the gateway server or dongle) is hashed together with a password known by both the administration machine 210 (FIG. 5) and the gateway server 610 (FIG. 6) (e.g., MD-5 hash) to obtain a key that is then used in an encryption algorithm, such as the Blowfish algorithm. This encrypted file is then UUencoded, in step 913, for transmission. The encrypted file 401 (FIG.

4) is transmitted, in step 915, from the administration machine 210 (FIG. 5) to a mail server 135 (FIG. 5). The mail server 135 (FIG. 5) stores, in step 920, the encrypted file 401 (FIG. 5).

One embodiment of the gateway site method steps 902 illustrates the steps taken by an example gateway site 150(0 . . . n) in retrieving and installing the configuration data (i.e., reconfiguring the gateway server 610 (FIG. 6)). Here, after waiting for a predetermined amount of time in step 925, the gateway server 610 (FIG. 6) checks, in step 940, the mail server 135 (FIG. 6) to see whether there is a new file on the mail server 135 (FIG. 6) from the administration site (FIG. 1B). If the gateway server 610 (FIG. 6) determines, in step 930, that there is no new file on the mail server 135 (FIG. 6), then the gateway server 610 (FIG. 6) waits again, in step 925, for the predetermined time interval and then checks, in step 940, the mail server 135 (FIG. 6) again. If, on the other hand, the gateway server 610 (FIG. 6) determines, in step 930, that there is a new file on the mail server 135 (FIG. 6) from the administration machine (FIG. 5), then the gateway server 610 retrieves, in step 935, the encrypted file 401 (FIG. 6) from the mail server 135 (FIG. 6). Upon retrieval 935 of the file, the gateway server processes, in step 945, the received file, thus, potentially reconfiguring the gateway site 150(i) in accordance with predefined processes and parameters in the received file.

FIG. 10 is a flow chart illustrating the retrieval step 935 of FIG. 9 in more detail. In this embodiment, once the file has been retrieved 935 and placed on the gateway server 610 (FIG. 6), the gateway server UUdecodes, in step 1024, the file. In UUdecoding 1024 the file, the gateway server FIG. 6) checks for the end-of-file (EOF) marker to ensure that the entire file is present, including combining the contents of multiple email messages if necessary. After UUdecoding 1024 the received file, the gateway server 610 (FIG. 6) checks, in step 1034, the UUdecoded encrypted file to make sure that the filename is an expected name stored on the gateway server 610, which provides another security mechanism and may be reconfigured. If the gateway server process determines, in step 1044, that the correct file has been sent to the correct gateway server 610 (FIG. 6), then the gateway server 610 (FIG. 6) transmits instructions to delete, in step 1054, the mail on the mail server 135 (FIG. 6). If, on the other hand, the gateway server determines 1044 that there is a mismatch, the gateway server 610 (FIG. 6) generates, in step 1064, a message stating that the incorrect file was delivered to that gateway server 610 (FIG. 6). The gateway

server 610 (FIG. 6) then sends, in step 1084, the message generated in step 1064 to the administration machine 210 (FIG. 2) alerting the administration machine 210 (FIG. 2) of the mismatch, which, like other messages received by the administration machine 210, also provides an intrusion indication if such messages were not prompted by the administration machine 210.

FIG. 11A is a flow chart illustrating the processing step 945 of FIG. 9 in more detail, including possibly reconfiguring the gateway server 610 (FIG. 6). Once the gateway server 610 (FIG. 6) retrieves 935 the file, the gateway server 610 (FIG. 6) decrypts and decompresses, in step 1010, the encrypted file 401 (FIG. 6) using the appropriate decryption and decompression algorithms as discussed above (i.e., the decryption and decompression algorithms associated with the encryption step 910 of FIG. 9). In addition, if multiple files were joined together before compression at the administration machine 210, the initial files are split back out into separate files. In decrypting, for example, the gateway server 610 (FIG. 6) could hash its serial number together with an expected password to obtain a key that is then used in the blowfish algorithm to decrypt the uudecoded encrypted file. The gateway server 610 (FIG. 6) then determines, in step 1020, whether the gateway server 610 (FIG. 6) successfully decrypted the encrypted file 401 (FIG. 6). If the gateway server 610 (FIG. 6) determines 1020 that decryption was unsuccessful, then the gateway server 610 (FIG. 6) generates, in step 1055, an unsuccessful decryption message identifying the encrypted file and the gateway server 610. This message is then transmitted, in step 1060, to the administration machine 210 (FIG. 2).

If, on the other hand, the gateway server 610 (FIG. 6) determines 1020 that decryption was successful, including authenticating the message, then the gateway server 610 (FIG. 6) further determines, in step 1030, whether the decrypted file is the correct configuration data 301 (FIG. 7C). For example, such could be done by analyzing data to determine if the configuration data 301 corresponds to the correct type of gateway server 610, such as by examining a box type field in the configuration data, serial number, etc. If the gateway server 610 (FIG. 6) determines 1030 that the configuration data 301 (FIG. 7C) is incorrect, then the gateway server 610 (FIG. 6) generates, in step 1035, an incorrect configuration data message identifying the decrypted configuration data and the gateway server 610 (FIG. 6). This message is then transmitted, in step 1060, to the administration machine 210 (FIG. 2).

If, in step 1030, the gateway server 610 (FIG. 6) determines that the correct configuration data 301 (FIG. 7C) has been received, the gateway server 610 (FIG. 6) executes install programs, in step 1040, the decrypted configuration data 301 (FIG. 7C). The installation 1040 may entail a "cold" install (i.e., an installation involving the rebooting of the gateway server 610 (FIG. 6)) or, alternatively, a "warm" install (i.e., an installation without rebooting). In either case, the gateway server 610 (FIG. 6) first updates its highly accessible and searchable repository, i.e., a database, before generating pertinent configuration files for use by applications and other executables on the gateway server 610 during installation 1040 of the configuration data 301 (FIG. 7C). Of course, other embodiments include avoiding any central repository or database, including simply writing downloaded configuration information to appropriate locations in the gateway server 610 (FIG. 6). The gateway server 610 (FIG. 6) then preferably updates, in step 1045, itself and the LAN at the gateway site 150(i) (FIG. 1B) by adding users and devices that should remain unchanged by the newly installed configuration data 301 (FIG. 7C). The gateway server 610 (FIG. 6) then generates, in step 1040, a successful installation email message including the configuration data. This message is then transmitted, in step 1060, to the administration machine 210 (FIG. 2). Of course, other embodiments of the present invention include generating such an email message between steps 1030 and 1040, and other embodiments include omitting step 1045.

FIG. 11B is a flow chart illustrating a method for confirming the reconfiguration of the gateway server 610 (FIG. 6) by the administration machine 210 (FIG. 2). Once the gateway server 610 (FIG. 6) transmits 1060 (FIG. 11A), or 1084 (FIG. 10), a message to the administration machine 210 (FIG. 2), the administration machine 210 (FIG. 2) receives, in step 1110, the message from the gateway server 610 (FIG. 6). Upon receiving 1110 the message, the administration machine 210 (FIG. 2) determines, in step 1120, whether the message is an incorrect file message. If the administration machine 210 (FIG. 2) determines, in step 1120, that an incorrect file was transmitted 913 (FIG. 9), the administration machine further determines, in step 1150, whether the correct file was transmitted 913 (FIG. 9) to the correct gateway server 610 (FIG. 6). If it is determined 1150 that the correct file was transmitted to the correct gateway server 610 (FIG. 6), the administration machine 210 (FIG. 2) transmits 915 (FIG. 9), again, the

file to the gateway server 610 (FIG. 6). If, however, in step 1150, it is determined that the file or gateway server 610 (FIG. 6) is incorrect, then the administration machine 210 (FIG. 2) modifies 905 (FIG. 9) the configuration data 301 (FIG. 3A) as necessary and repeats the steps of FIG. 9.

If, in step 1120, the administration machine 210 (FIG. 2) determines that a correct file was transmitted 913 (FIG. 9), the administration machine further determines, in step 1130, whether the decryption 1010 (FIG. 11A) was successful. If it is determined that the decryption 1010 (FIG. 11A) was unsuccessful, the administration machine determines, in step 1150, whether the correct file was transmitted 913 (FIG. 9) to the correct gateway server 610 (FIG. 6). If it is determined 1150 that the correct file was transmitted 915 (FIG. 9) to the correct gateway server 610 (FIG. 6), the administration machine (FIG. 2) transmits 915 (FIG. 9), again, the file to the gateway server 610 (FIG. 6). If, however, in step 1150, it is determined that the file or gateway server 610 (FIG. 6) is incorrect, then the administration machine 210 (FIG. 2) modifies 905 (FIG. 9) the configuration data 301 (FIG. 3A) and repeats the steps of FIG. 9.

If, in step 1130, the administration machine 210 (FIG. 2) determines that the decryption 1010 (FIG. 11A) was successful, then it further determines, in step 1140, whether the correct configuration data 301 (FIG. 7C) has been installed 1040 (FIG. 11A). If it is determined 1140 that the incorrect data has been received, the administration machine 210 (FIG. 2) determines, in step 1150, whether the correct file was transmitted 913 (FIG. 9) to the correct gateway server 610 (FIG. 6). If it is determined 1150 that the correct file was transmitted 915 (FIG. 9) to the correct gateway server 610 (FIG. 6), the administration machine (FIG. 2) transmits 915 (FIG. 9), again, the file to the gateway server 610 (FIG. 6). If, however, in step 1150, it is determined that the file or gateway server 610 (FIG. 6) is incorrect, then the administration machine 210 (FIG. 2) modifies 905 (FIG. 9) the configuration data 301 (FIG. 3A) and repeats the steps of FIG. 9. If, in step 1140, the administration machine 210 (FIG. 2) determines that the correct configuration data 301 (FIG. 7C) has been received, and presumably installed 1040 (FIG. 11A), the process ends until the administrator desires to update the gateway server's 610 (FIG. 6) configuration data 301 (FIG. 7C)

FIG. 12 is a flow chart 1200 illustrating a method of monitoring the gateway servers 610 (FIG. 6) by the administration machine 210 (FIG. 2). This method, similar to the configuration

method (FIGS. 9, 10, 11A, and 11B), may be viewed as gateway method steps 1201 (i.e., a method employed by the gateway server 610 (FIG. 6)) and administration method steps 1202 (i.e., a method employed by the administration machine 210 (FIG. 2)). The gateway server 610 (FIG. 6) periodically generates, in step 1210, a message having gateway identification information, the time of the latest update, and the configuration data from the latest update. This message is then transmitted, in step 1220, from the gateway server 610 (FIG. 6) to the administration machine 210 (FIG. 2). The transmission of the message may be done via email through the mail server 135 (FIG. 1B). In the preferred embodiment, this is in addition to the information used merely to inform the administration machine 210 (FIG. 2) of the active status of the gateway server 610 (FIG. 6) through user datagram protocol (UDP) packets. The administration machine 210 (FIG. 2) receives, in step 1230, the message from the gateway server 610 (FIG. 6) and determines, in step 1240, whether the gateway server 610 (FIG. 6) is correctly configured with the latest configuration data. If the administration machine 210 (FIG. 2) determines 1240 that all the information is correct (i.e., the latest configuration data is correctly installed on the gateway server 610 (FIG. 6)), then the process ends until the administrator wishes to reconfigure the gateway server 610 (FIG. 6). If, on the other hand, the administration machine determines 1240 that the gateway server 610 (FIG. 6) is incorrectly configured, then the administrator 210 (FIG. 2) reconfigures the gateway server 610 (FIG. 6) by going through the reconfiguration process of FIG. 9.

As seen from FIGS. 9 through 12, this method, in one implementation, allows for reconfiguration and management of remote gateway servers through configuration data created 905 (FIG. 9), encrypted 910 (FIG. 9), and transmitted 915 (FIG. 9) by an administration machine 210 (FIG. 2), and subsequently retrieved 935 (FIG. 9) by a gateway server 610 (FIG. 6) for processing 945 (FIG. 9). The "pulling" of files from a remote platform (e.g., mail server 135 (FIG. 1B)) allows for the secure management of remote gateway servers. Moreover, the steps of generating messages by the gateway server 610 (FIG. 6) for the administration machine 210 (FIG. 2) allows for the remote monitoring of the gateway sites 150(0 . . . n) (FIG. 1B) by the administration machine 210 (FIG. 2). This method 900 provides a simple, yet secure, method of managing and monitoring remote gateway sites 150(0 . . . n) (FIG. 1B) by the "pulling," rather

than the "pushing," of configuration information from a remote platform by the gateway sites 150(0 . . . n) (FIG. 1B).

Any process descriptions or blocks in flow charts should be understood as representing modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in the process, and alternate implementations are included within the scope of the preferred embodiment of the present invention in which functions may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art of the present invention. In addition, one or more steps may be omitted or combined with others steps in other embodiments. The programming discussed herein, which comprises an ordered listing of executable instructions for implementing logical functions, can be, without limitation, embodied in any computer-readable medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions. In the context of this document, a "computer-readable medium" can be any means that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The computer readable medium can be, for example but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, device, or propagation medium. More specific examples (a nonexhaustive list) of the computer-readable medium would include the following: an electrical connection (electronic) having one or more wires, a portable computer diskette (magnetic), a random access memory (RAM) (electronic), a read-only memory (ROM) (electronic), an erasable programmable read-only memory (EPROM or Flash memory) (electronic), an optical fiber (optical), and a portable compact disc read-only memory (CDROM) (optical). Note that the computer-readable medium could even be paper or another suitable medium upon which the program is printed, as the program can be electronically captured, via for instance optical scanning of the paper or other medium, then compiled, interpreted or otherwise processed in a suitable manner if necessary, and then stored in a computer memory.

It should also be clearly understood that the scope of the present invention includes virtually any device that can receive configuration information, such as through e-mail. Besides gateway servers, automated teller machines, etc., other devices in the very wide area could include, without limitation, refrigerators have network access, network printers, etc.

While particular embodiments of the invention have been disclosed in detail in the foregoing description and drawings for purposes of example, it will be understood by those skilled in the art that variations and modifications thereof can be made without departing from the scope of the invention as set forth in the following claims.

CLAIMS

We claim:

1. A secure system for configuring remote networked devices and gateway servers, comprising:

an administration machine comprising a device configured to create, update and maintain a collection of configuration data, the administration machine further comprising a storage device configured to store the configuration data, the administration machine further comprising a process to retrieve the configuration data from the storage device, compress and encrypt the configuration data to produce an encrypted file, the administration machine further comprising a network interface configured to interface with a network and transmit the encrypted file;

a remote email server configured to receive the encrypted file from the administration machine and store the encrypted file; and

a gateway server configured to retrieve the encrypted file from the email server, the gateway server comprising a network interface configured to receive the encrypted file, the gateway server further comprising a storage device to store the encrypted file, the gateway server further comprising a process to retrieve the encrypted file from the storage device and decrypt the encrypted file to produce decrypted configuration data and reconfigure the gateway server according to the configuration data.

2. A secure system for communicating with devices, comprising:

a central server having at least one file; and

at least one initialized device configured to retrieve the file from the central server in response to a polling of the central server by the at least one initialized device.

3. The system of claim 2, wherein the central server is a mail server.

4. The system of claim 3, wherein the mail server is an accessible email server.

5. The system of claim 2, wherein the at least one file includes configuration data.

6. The system of claim 5, wherein the at least one initialized device is further configured to reconfigure system parameters of the at least one device according to the configuration data.

7. The system of claim 6, wherein the at least one initialized device is a gateway server.

8. The system of claim 7, further comprising a local area network (LAN) connected to the gateway server.

9. The gateway server of claim 7, wherein the system parameters include host configuration.

10. The gateway server of claim 7, wherein the system parameters include device setup configuration.

11. The gateway server of claim 7, wherein the system parameters include domain name system (DNS) management configuration.

12. The gateway server of claim 7, wherein the system parameters include firewall object configuration.

13. The gateway server of claim 7, wherein the system parameters include firewall rule configuration.

14. The gateway server of claim 7, wherein the system parameters include firewall status configuration.

15. The gateway server of claim 7, wherein the system parameters include email setup configuration.

16. The gateway server of claim 7, wherein the system parameters include user setup configuration.

17. The gateway server of claim 7, wherein the system parameters include group setup configuration.

18. The gateway server of claim 7, wherein the system parameters include file share configuration.

19. The gateway server of claim 7, wherein the system parameters include device operating statistics configuration.

20. The system of claim 5, wherein the configuration data is an encrypted file.

21. The system of claim 20, wherein the at least one initialized device is further configured to decrypt and authenticate the encrypted file.

22. The system of claim 21, wherein the at least one initialized device further comprises:

a network interface configured to receive the encrypted file;

a storage device configured to store the encrypted file; and

a processor configured to retrieve the encrypted file from the storage device and decrypt the encrypted file to produce decrypted configuration data.

23. The system of claim 2, wherein the at least one initialized device is a networked

device or gateway server.

24. The system of claim 2, wherein the at least one initialized device is an automatic teller machine.

25. The system of claim 2, wherein the polling of the central server is done on a predetermined, random or requested schedule.

26. The system of claim 2, wherein the polling of the central server is done periodically.

27. The system of claim 2, further comprising an administration machine configured to create the at least one file and securely transmit the at least one file to the central server.

28. The system of claim 27, further comprising a local area network (LAN), WAN, Internet or modem connected to the administration machine.

29. The system of claim 27, wherein the administration machine further comprises:

a firewall configured to prevent unauthorized access to the administration machine;

a network interface configured to interface the administration machine with a network;

an input device configured to receive user instructions to edit at least one file;

a storage device configured to store the at least one file; and

a processor configured to retrieve the at least one file from the storage device and encrypt the at least one file, the processor further configured to transmit the encrypted file.

30. The system of claim 28, wherein the administration machine further comprises a remote configuration port configured to receive at least one file from a workstation on the local area network (LAN).

31. A method for securely configuring remote networked devices, comprising the steps of:

retrieving configuration data from a staging platform; and

reconfiguring a networked device according to the configuration data in response to the retrieving step.

32. The method of claim 31 further comprising the steps of:

creating a configuration database;

encrypting data from the configuration database to produce an encrypted file;

transmitting the encrypted file; and

storing the encrypted file on a central server.

33. The method of claim 31, further comprising the step of polling a central server.

34. The method of claim 31 further comprising the step of notifying an administration machine in response to the reconfiguring step.

35. The method of claim 32, further comprising the step of decrypting the encrypted file to produce decrypted configuration data.

36. The method of claim 35, wherein the reconfiguring step is further in response to the decrypting step.

37. The method of claim 32, wherein the retrieving step is responsive to a polling of a central server.

38. The method of claim 37, wherein the polling is done on a predetermined schedule.

39. The method of claim 37, wherein the polling is done periodically.

40. The method of claim 37, wherein the networked device is a gateway server.

41. A system for securely configuring remote networked devices, comprising:
means for retrieving configuration data; and
means for reconfiguring a networked device according to the configuration data.

42. The system of claim 41 further comprising:
means for creating a configuration database;
means for encrypting data from the configuration database to produce an encrypted file;
means for transmitting the encrypted file; and
means for receiving and storing the encrypted file.

43. The system of claim 41, further comprising means for notifying an administration machine of a reconfiguration of system parameters.

44. The system of claim 42, further comprising means for decrypting the encrypted file to produce decrypted configuration data.

45. The system of claim 41, further comprising means for polling a central server.

46. The system of claim 41, further comprising means for polling a central server at a predetermined schedule.

47. The system of claim 41, further comprising a means for periodically polling a central server.

48. The system of claim 45, wherein the retrieving step is responsive to the polling step.

49. The system of claim 46, wherein the retrieving step is responsive to the polling step.

50. The system of claim 47, wherein the retrieving step is responsive to the polling step.

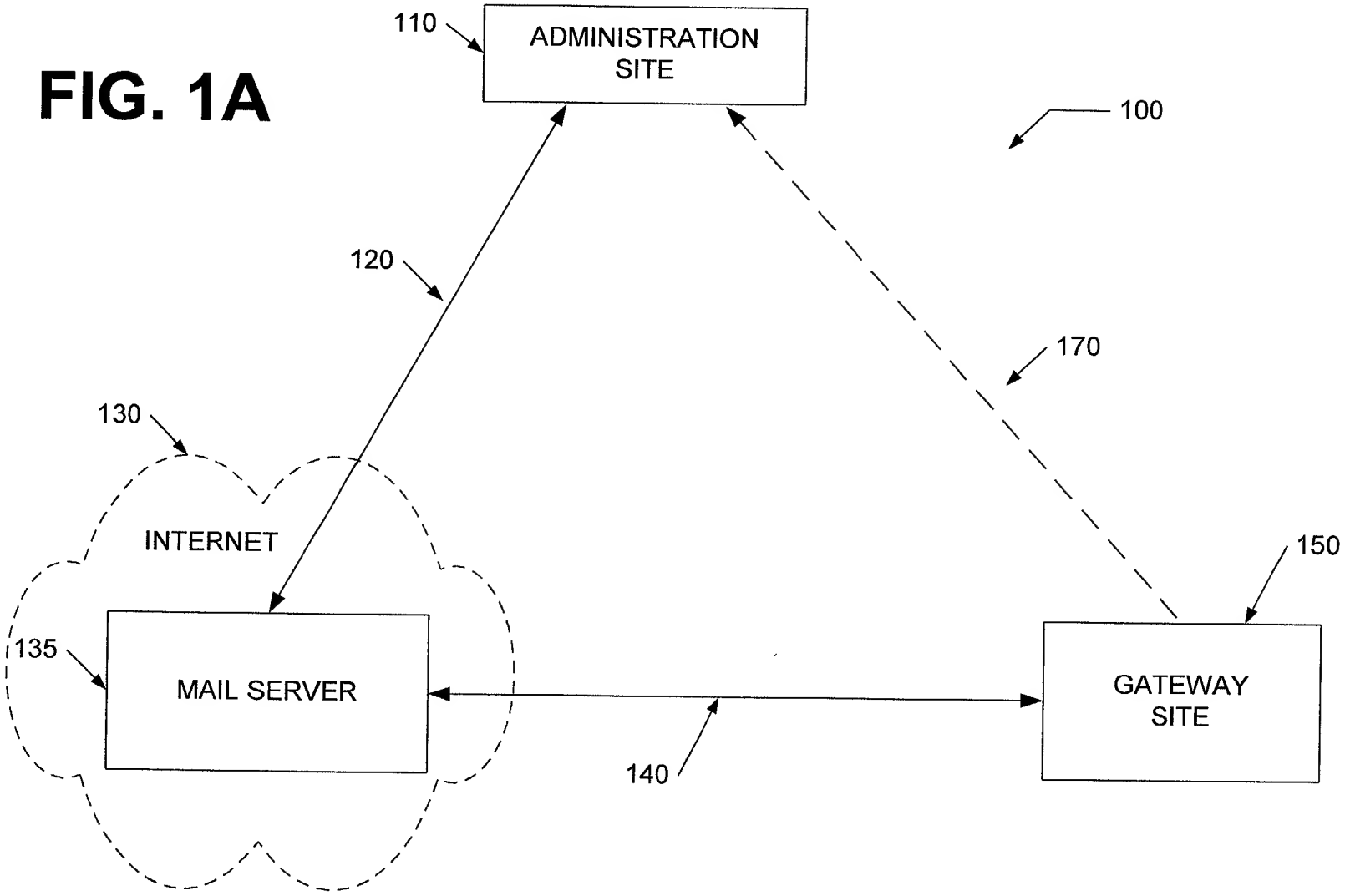
51. The system of claim 41, wherein the networked device is a gateway server.

ABSTRACT OF THE DISCLOSURE

A secure system and method for managing and monitoring remote devices preferably includes periodic pulling of configuration information from an accessible platform rather than pushing information from a central site. In one implementation, an electronic mail system is used as a staging platform in combination with a defined polling arrangement to transfer encrypted configuration information in a robust and secure method for updating remote device configurations.

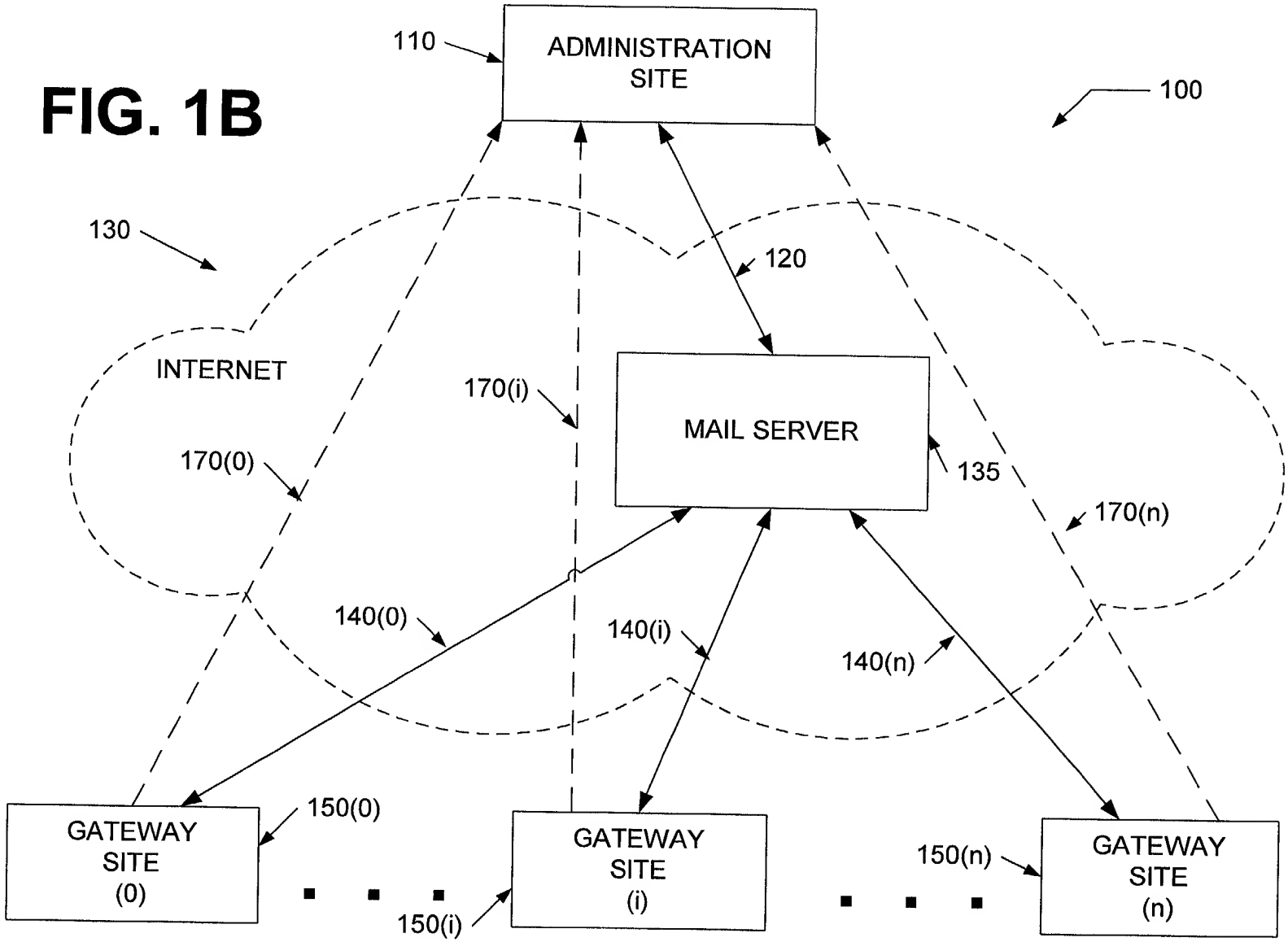
SAMPLE

FIG. 1A



SOFTBOT EXHIBIT 2

FIG. 1B



DEFENDANT EXHIBIT

FIG. 2

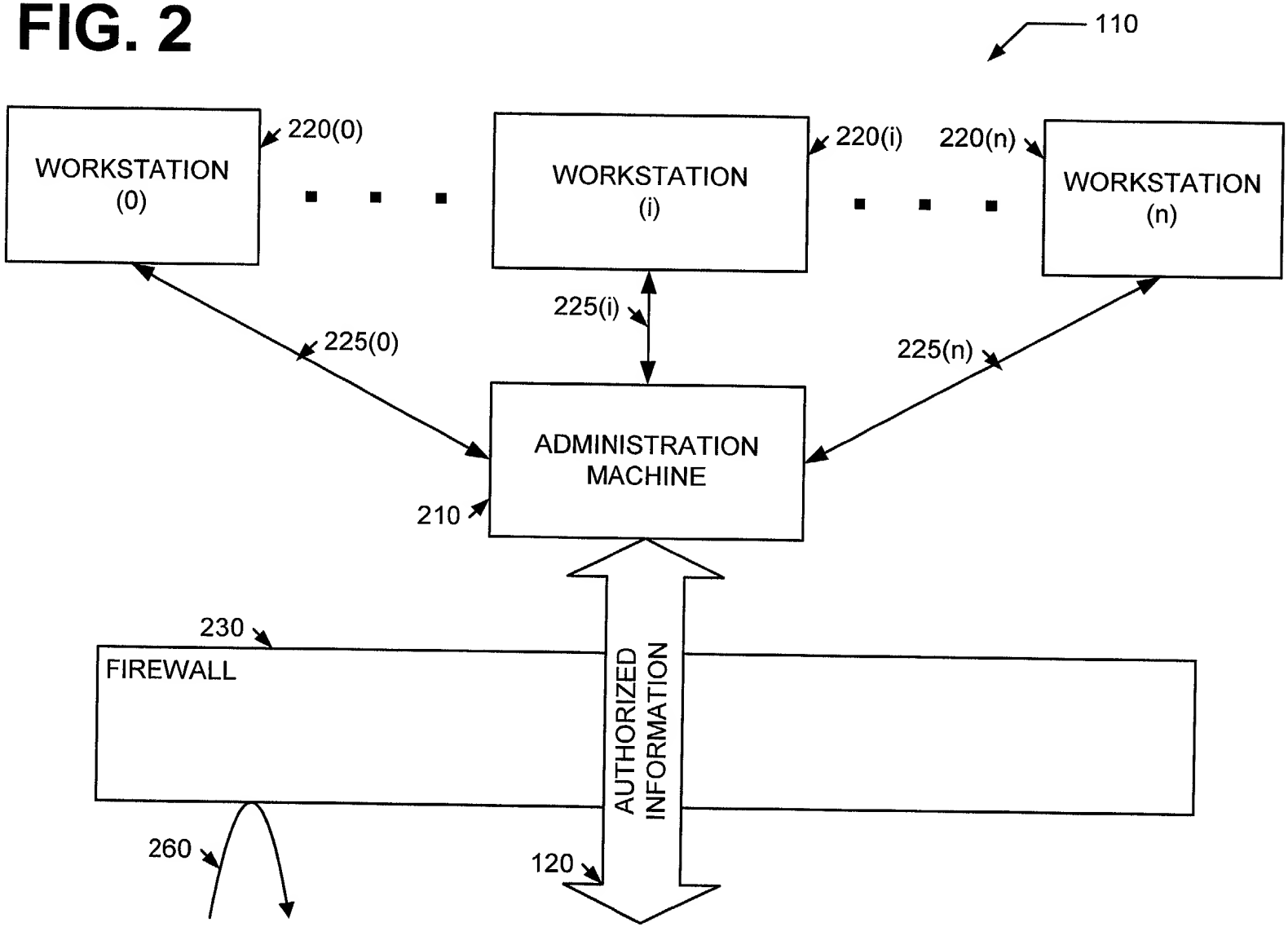
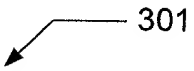


FIG. 3A



CONFIGURATION DATA

ADMINISTRATION MANAGEMENT

- ENCRYPTION / DECRYPTION KEY
- CLIENT DATA
- CLIENT STATUS

:

GATEWAY SERVER

HOST INFORMATION
DEVICE SETUP
MANAGE DOMAIN NAME SYSTEM (DNS)
MANAGE ROUTES
MANAGE DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)
DEFINE FIREWALL OBJECTS
DEFINE FIREWALL RULES
CHECK FIREWALL STATUS
SETUP EMAIL
SETUP USERS
SETUP GROUPS
CONFIGURE FILE SHARING
CHECK DEVICE OPERATING STATISTICS

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.
.

DOCKET ALARM

FIG. 3B

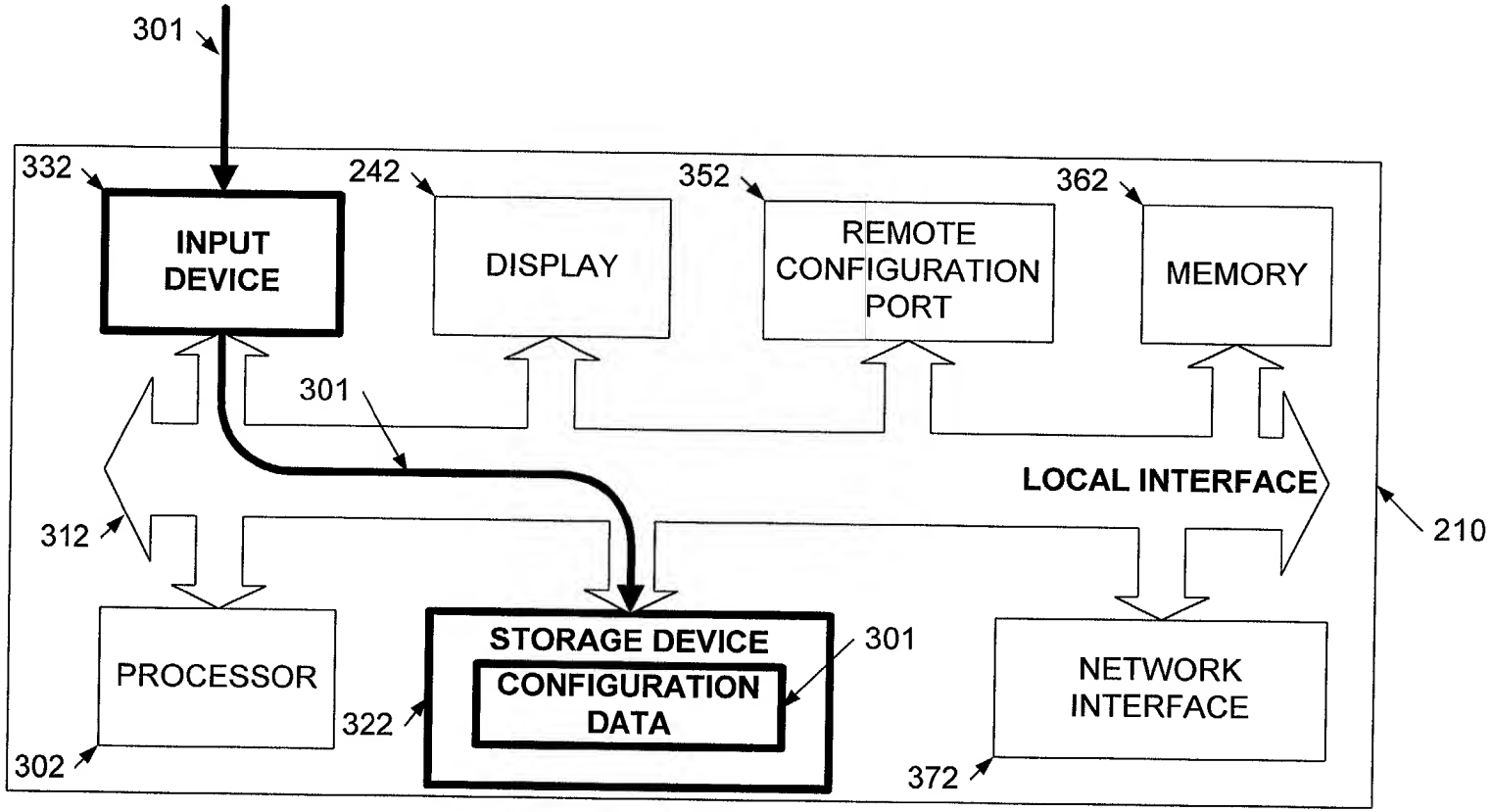
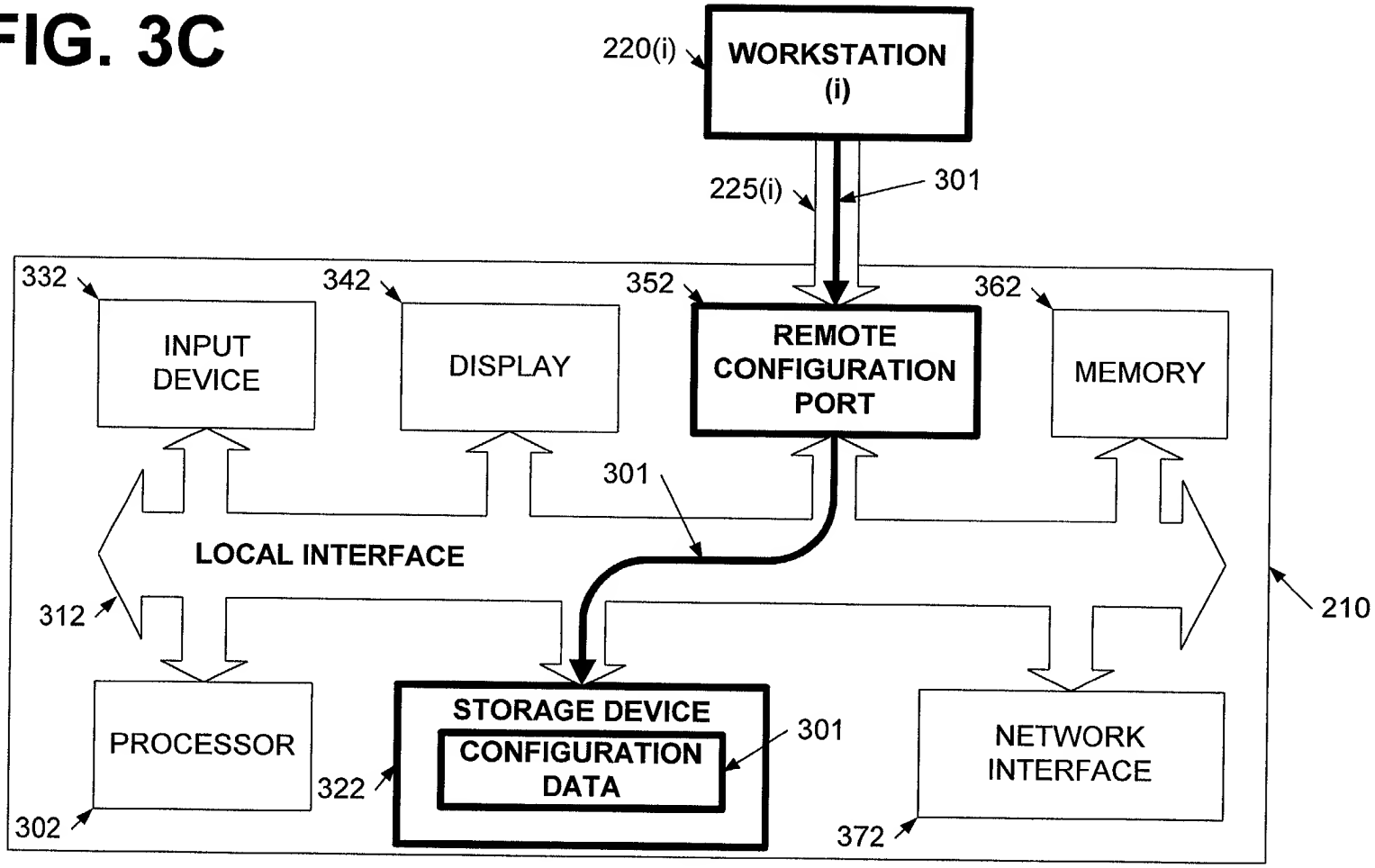
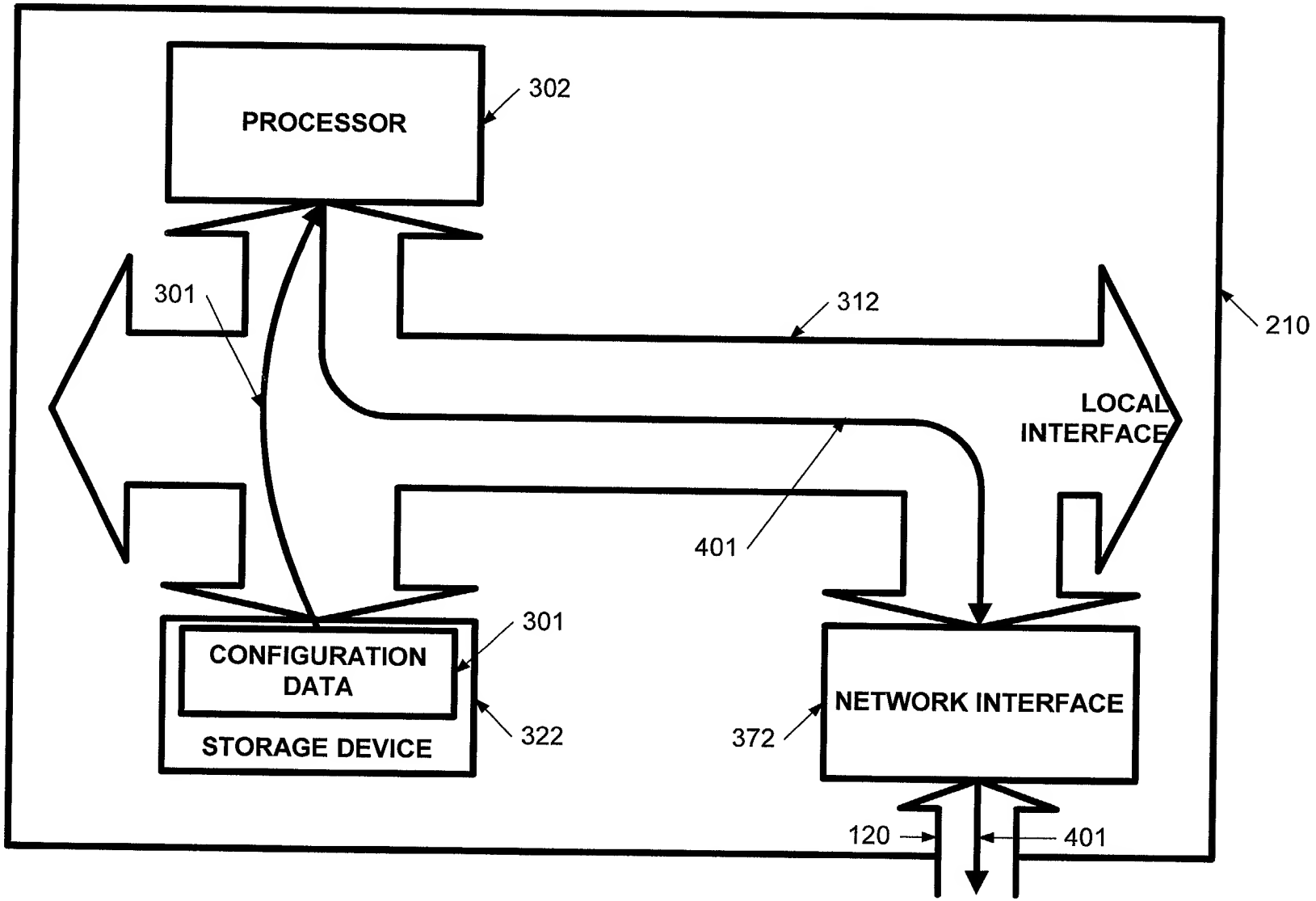


FIG. 3C


220(i)
WORKSTATION (i)
225(i)
301
332
INPUT DEVICE
342
DISPLAY
352
REMOTE CONFIGURATION PORT
362
MEMORY
301
LOCAL INTERFACE
312
210
PROCESSOR
302
STORAGE DEVICE
CONFIGURATION DATA
322
301
NETWORK INTERFACE
372

Patent Application

FIG. 4



SUBSTITUTE SHEET (RULE 26)

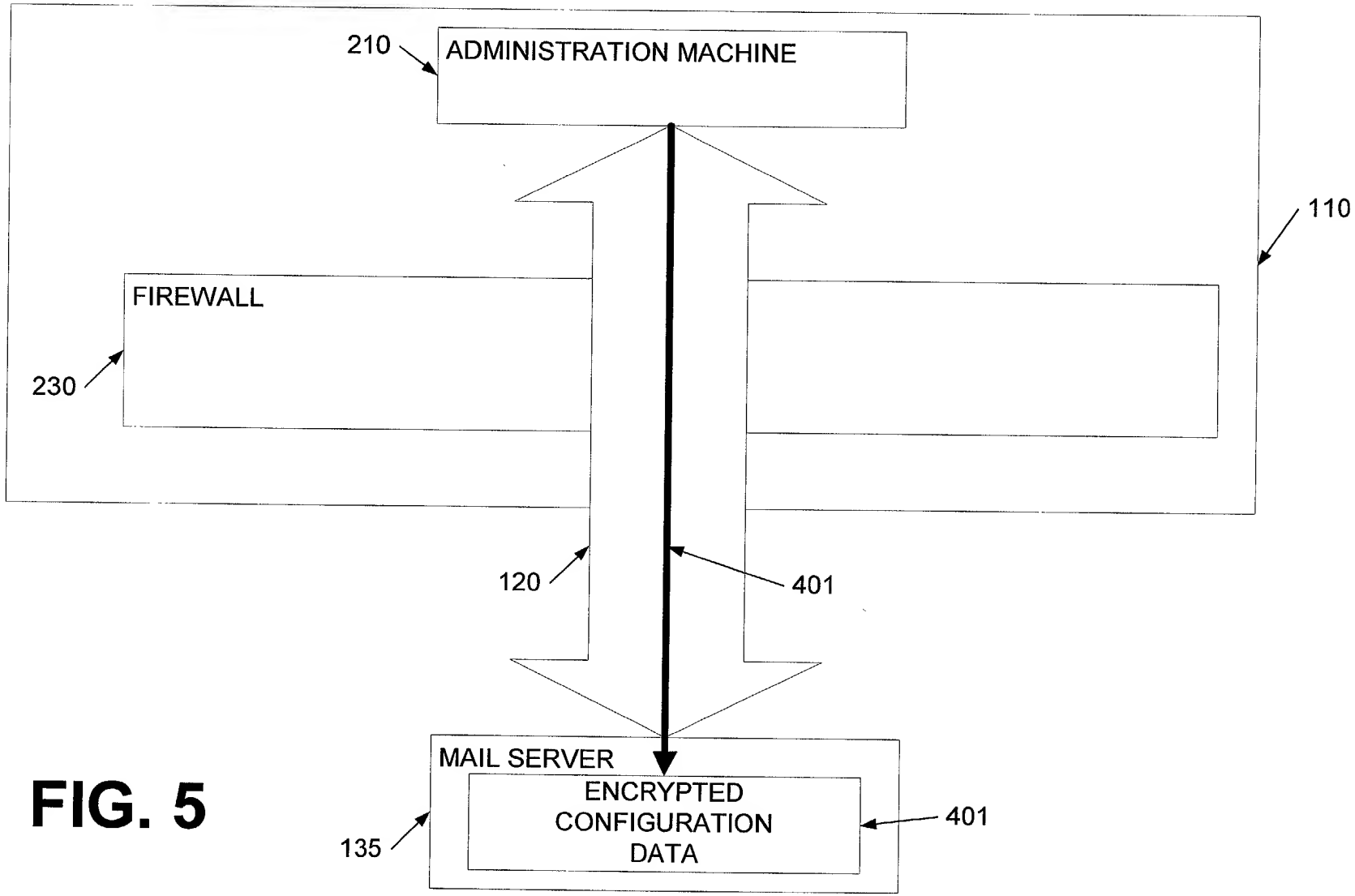
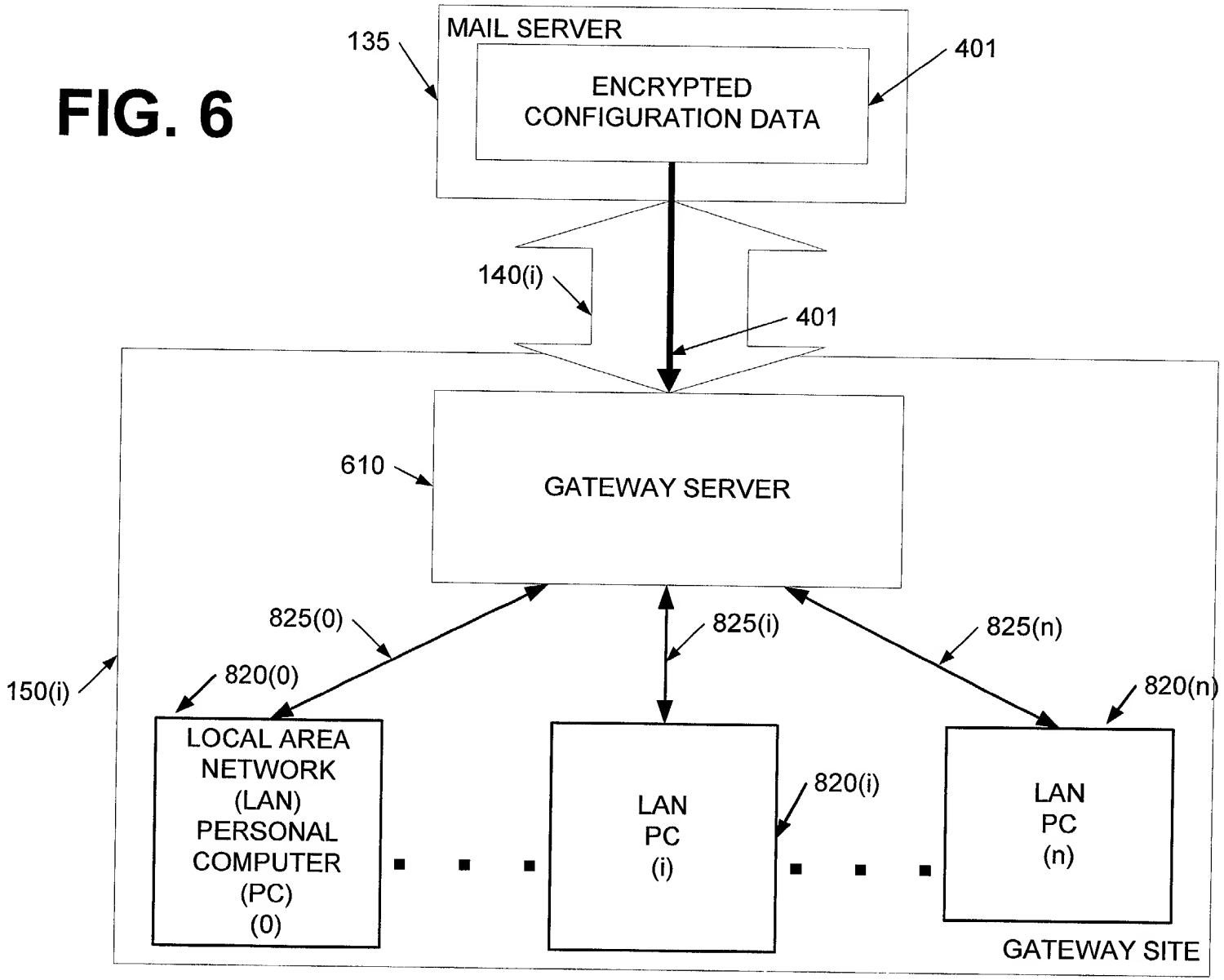


FIG. 5

DRAFT 2018

FIG. 6



DRAFT EXHIBIT

FIG. 7A

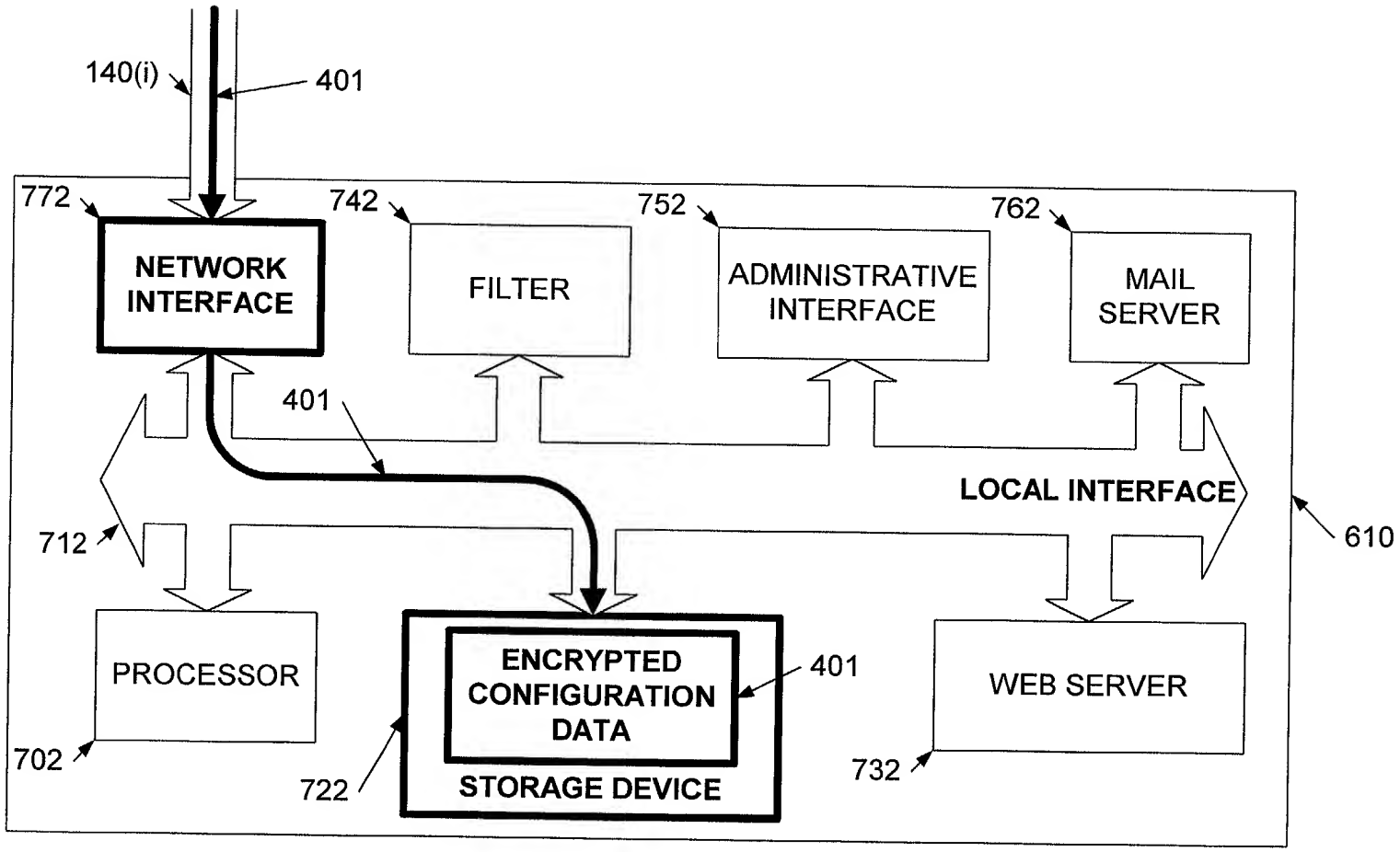


FIG. 7B

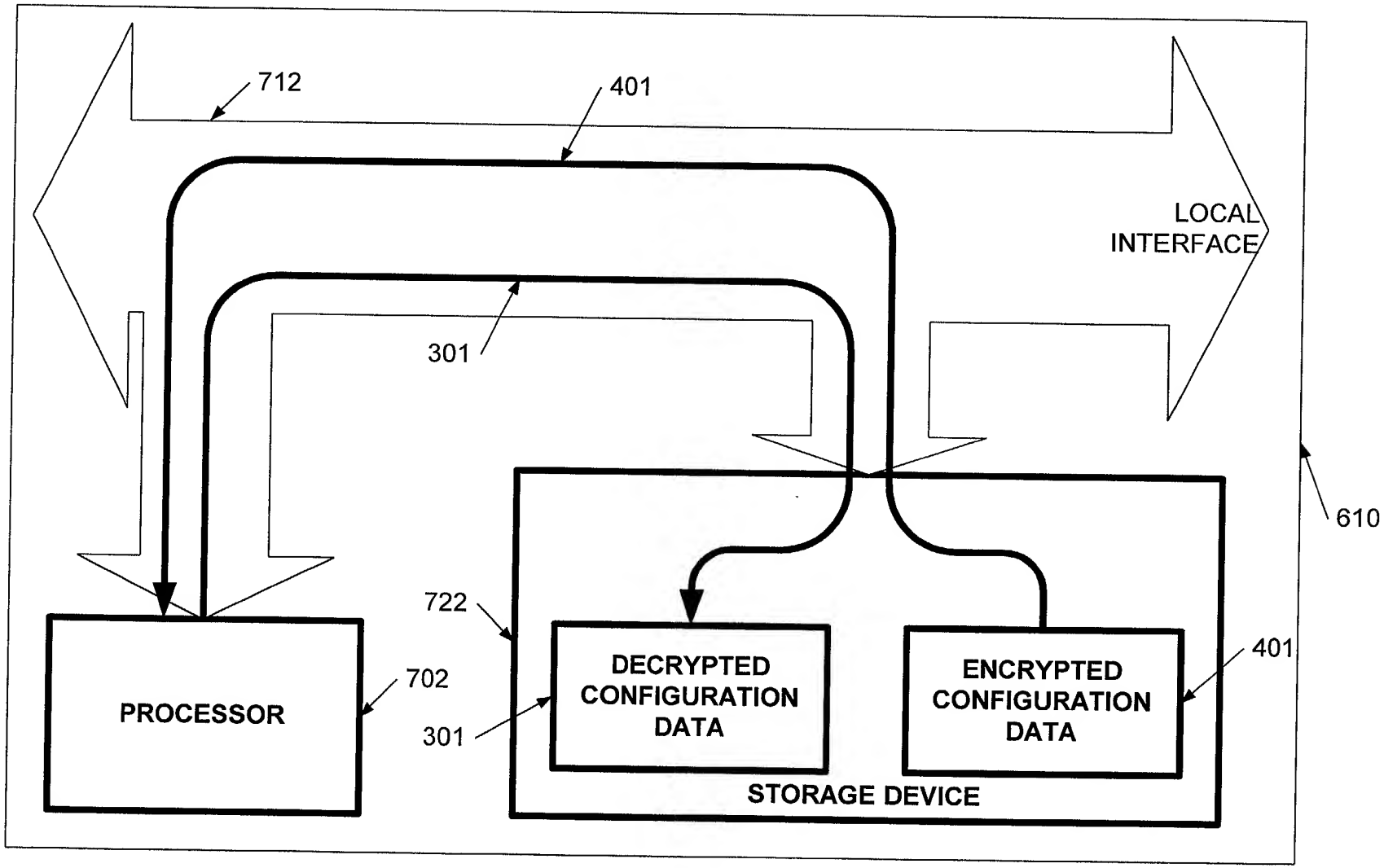
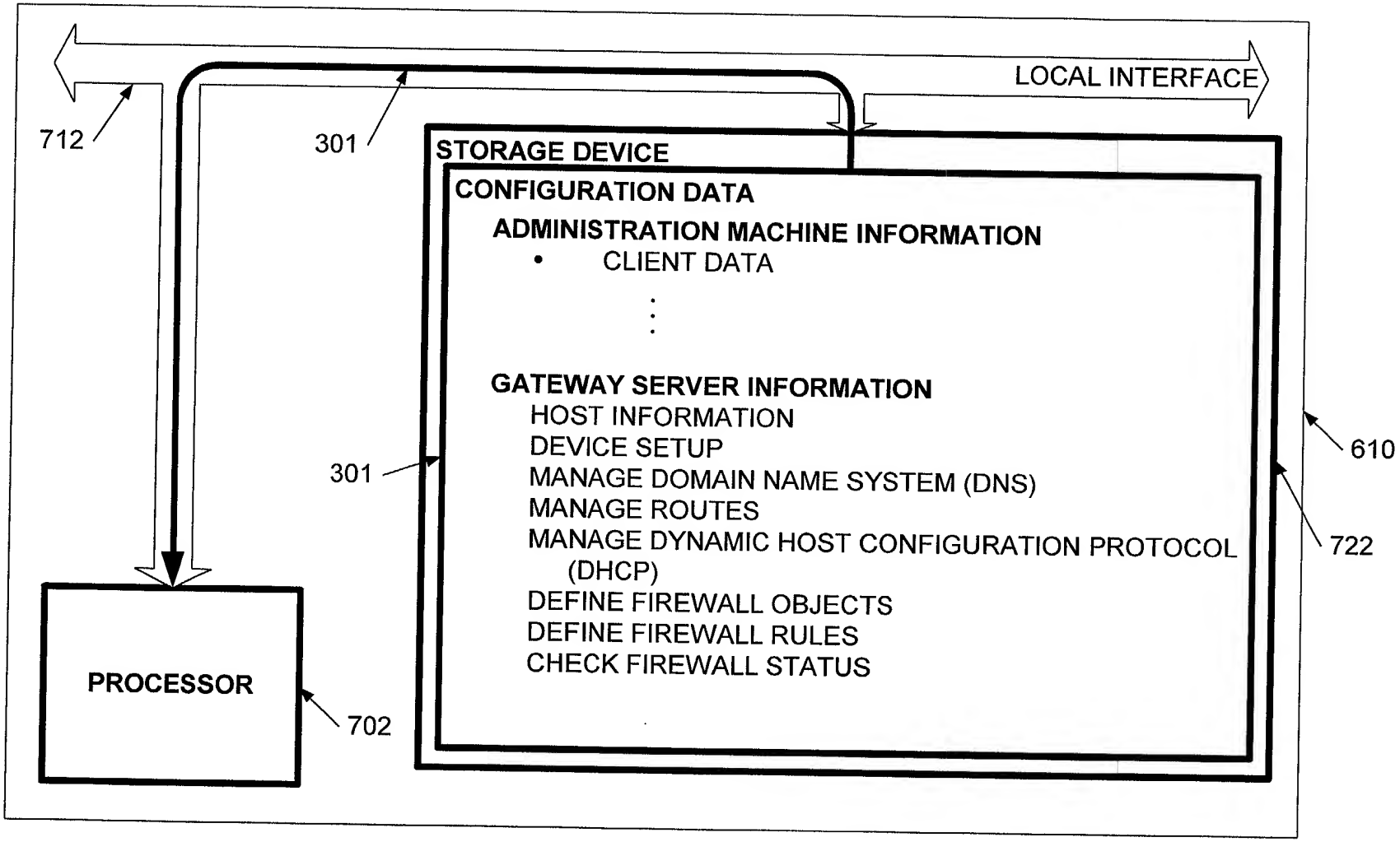
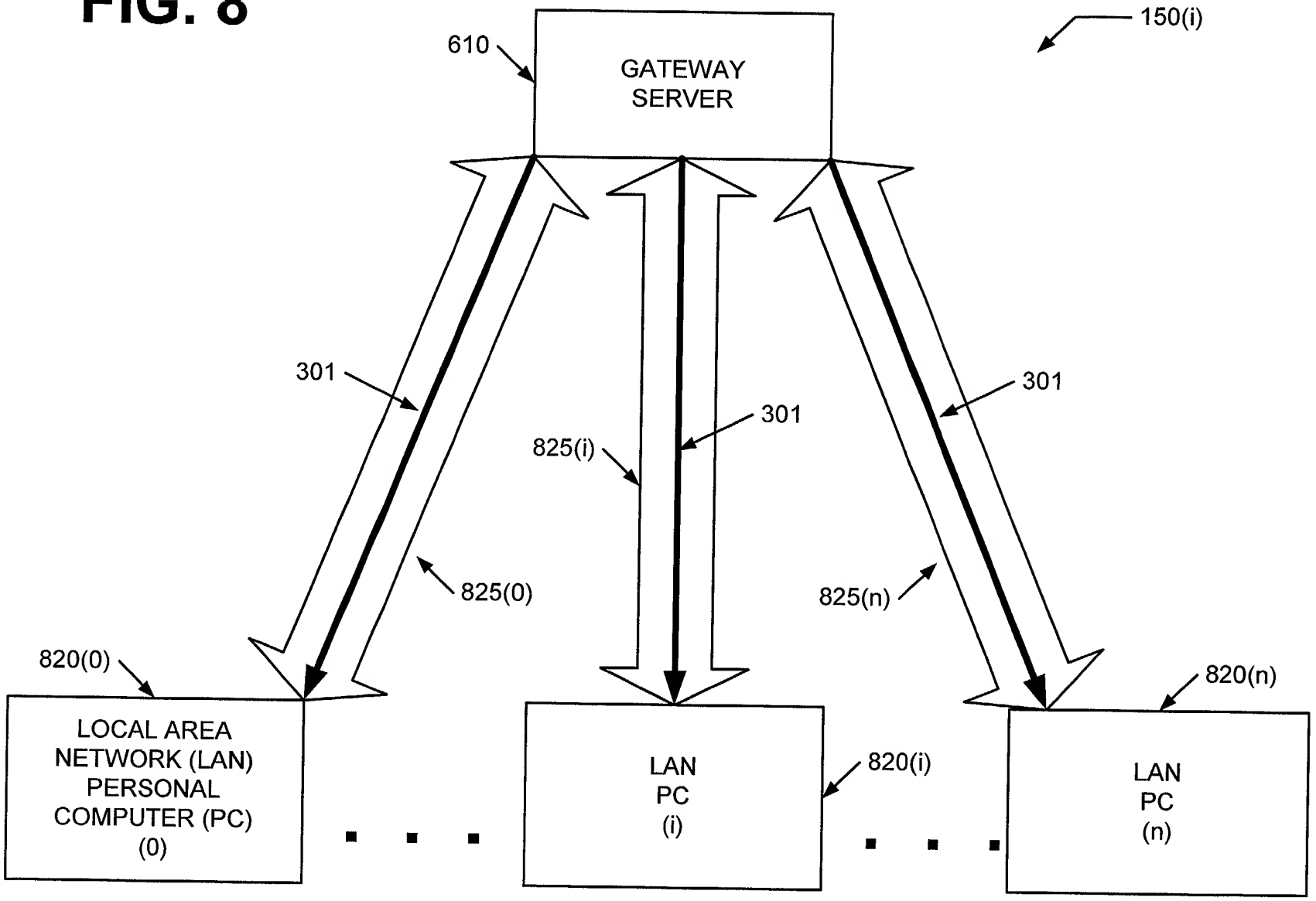

712
401
LOCAL INTERFACE
301
610
722
DECRYPTED CONFIGURATION DATA
ENCRYPTED CONFIGURATION DATA
401
PROCESSOR
702
301
STORAGE DEVICE

FIG. 7C


LOCAL INTERFACE
712
301
STORAGE DEVICE
CONFIGURATION DATA
ADMINISTRATION MACHINE INFORMATION
• CLIENT DATA
GATEWAY SERVER INFORMATION
HOST INFORMATION
DEVICE SETUP
MANAGE DOMAIN NAME SYSTEM (DNS)
MANAGE ROUTES
MANAGE DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)
DEFINE FIREWALL OBJECTS
DEFINE FIREWALL RULES
CHECK FIREWALL STATUS
301
610
722
PROCESSOR
702

DRAFT CONFIDENTIAL

FIG. 8



DETECT-EBIDEAS

FIG. 9

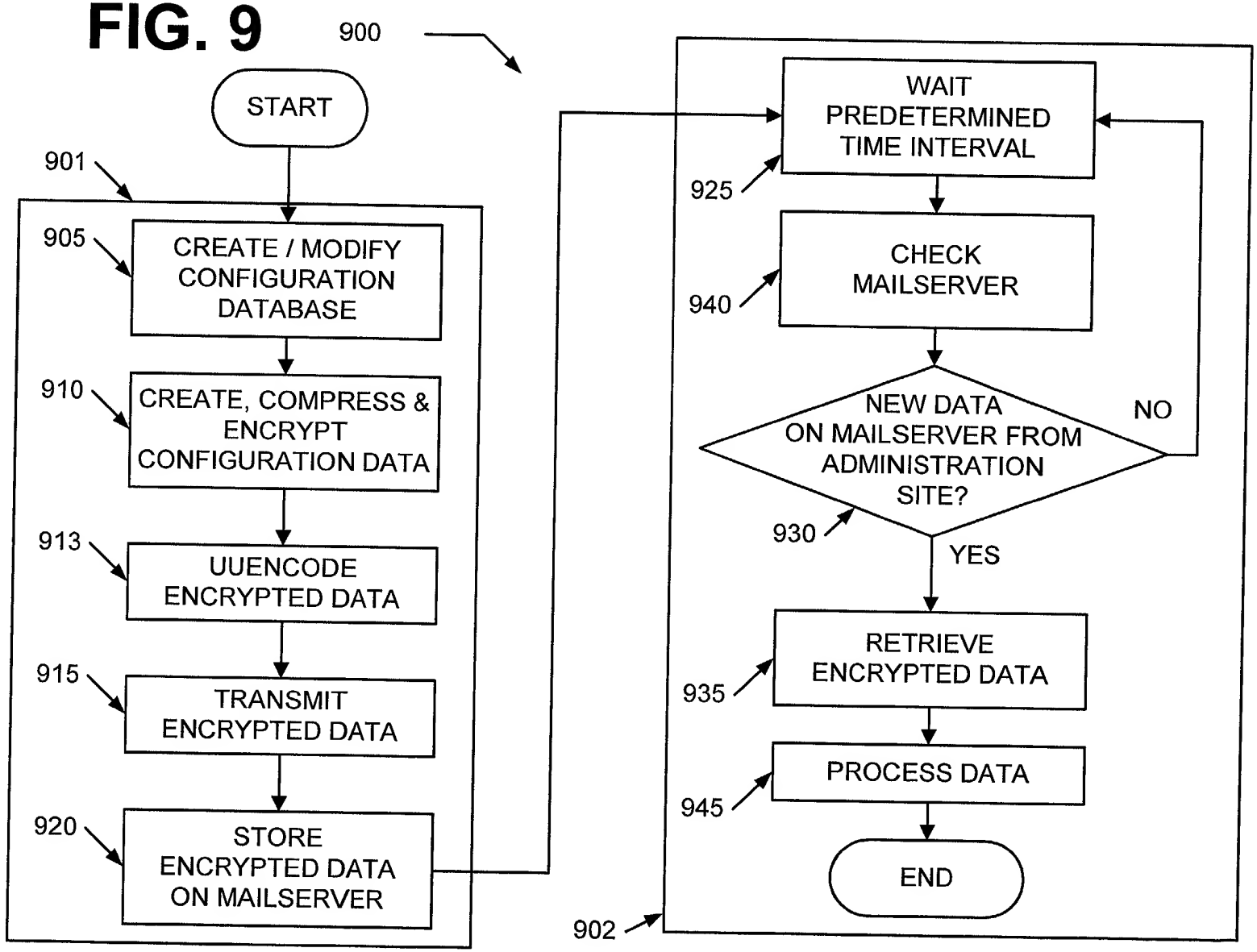
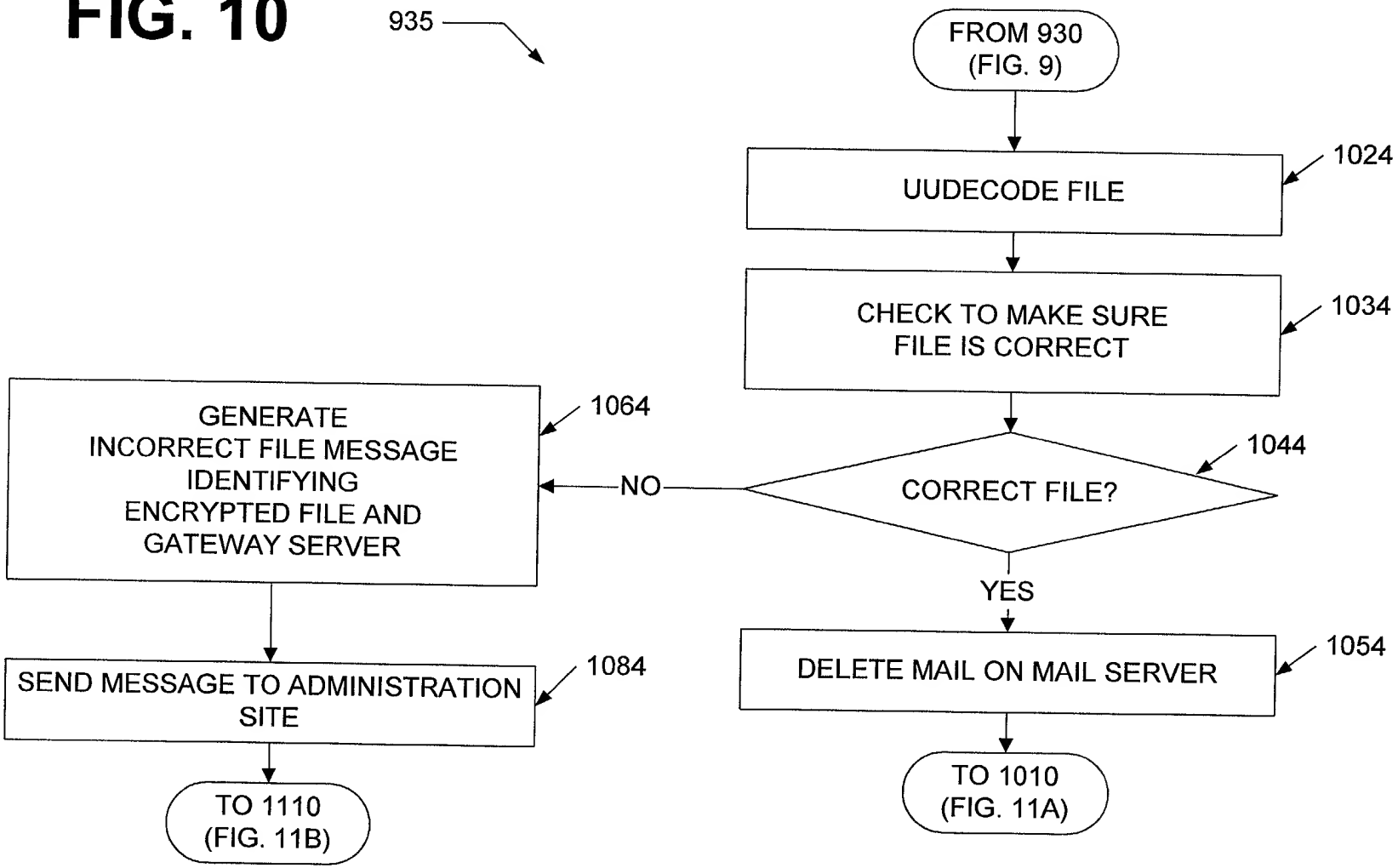
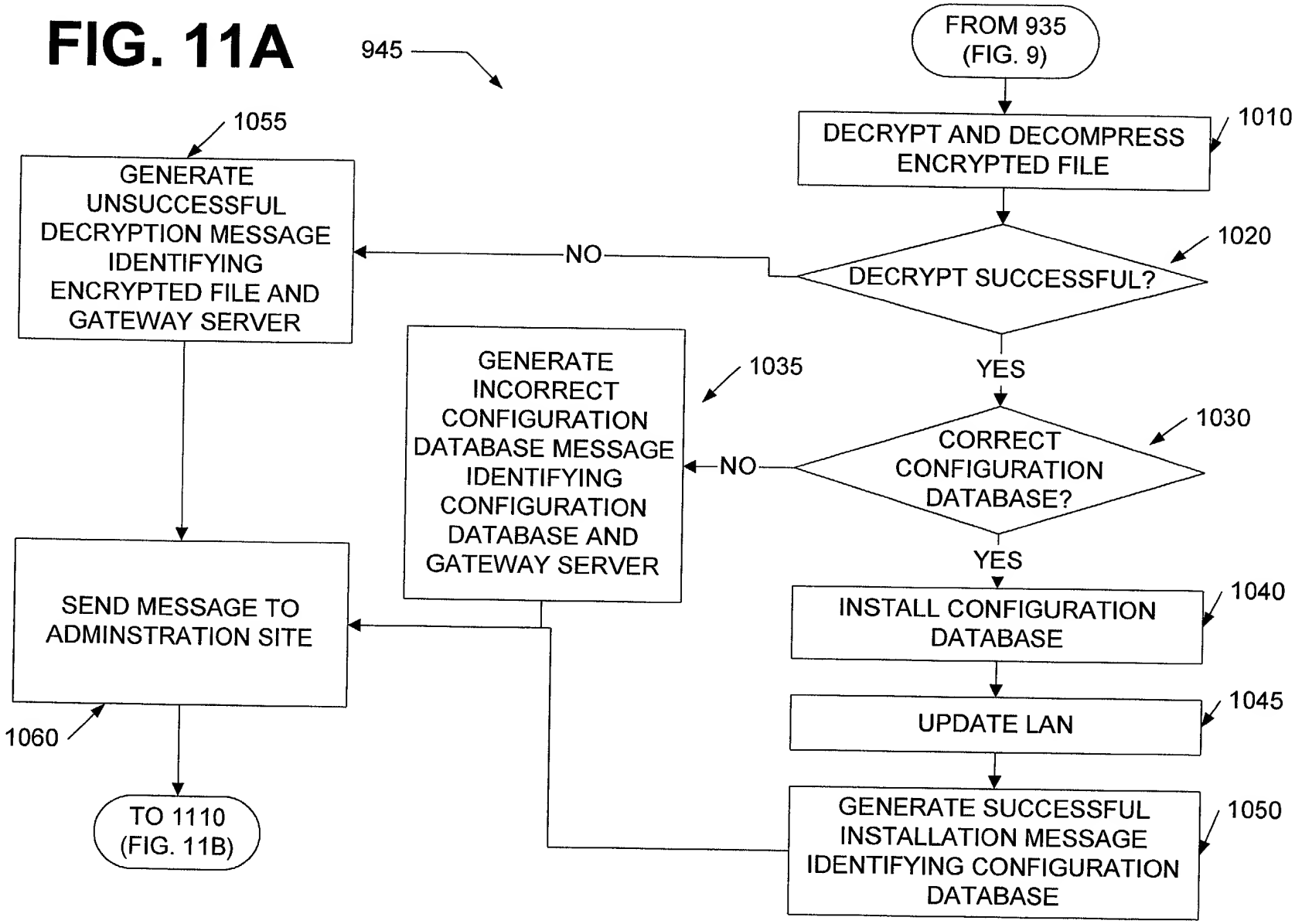


FIG. 10


935
FROM 930
(FIG. 9)
UUDECODE FILE
1024
CHECK TO MAKE SURE
FILE IS CORRECT
1034
CORRECT FILE?
1044
NO
GENERATE
INCORRECT FILE MESSAGE
IDENTIFYING
ENCRYPTED FILE AND
GATEWAY SERVER
1064
YES
DELETE MAIL ON MAIL SERVER
1054
SEND MESSAGE TO ADMINISTRATION
SITE
1084
TO 1010
(FIG. 11A)
TO 1110
(FIG. 11B)

DRAFT EDITION

FIG. 11A



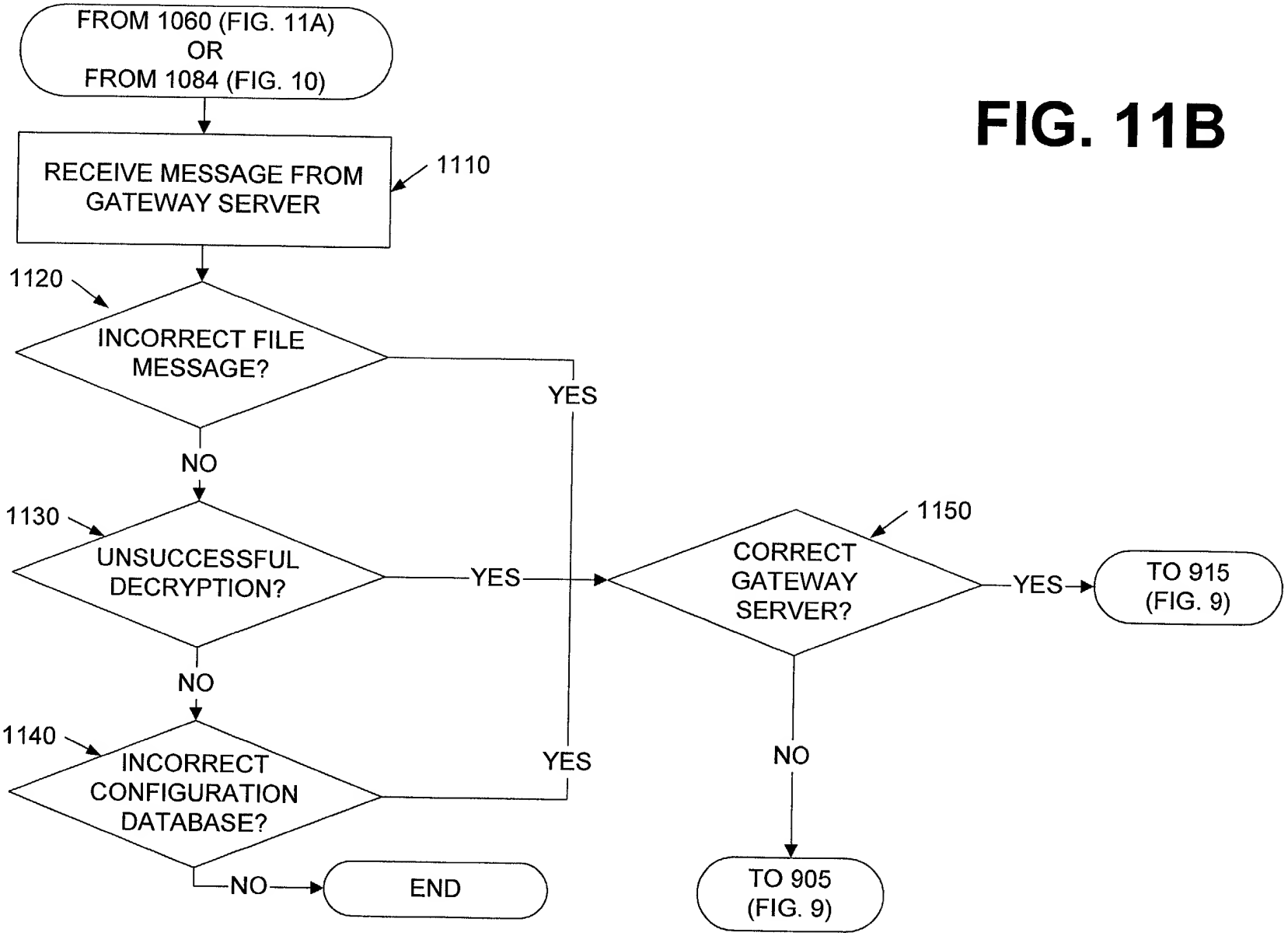

FROM 1060 (FIG. 11A)
OR
FROM 1084 (FIG. 10)
RECEIVE MESSAGE FROM GATEWAY SERVER
1110
1120
INCORRECT FILE MESSAGE?
YES
NO
1130
UNSUCCESSFUL DECRYPTION?
YES
NO
1140
INCORRECT CONFIGURATION DATABASE?
YES
NO
END
1150
CORRECT GATEWAY SERVER?
YES
TO 915 (FIG. 9)
NO
TO 905 (FIG. 9)

FIG. 11B

DOCKET NO. 2003-0243

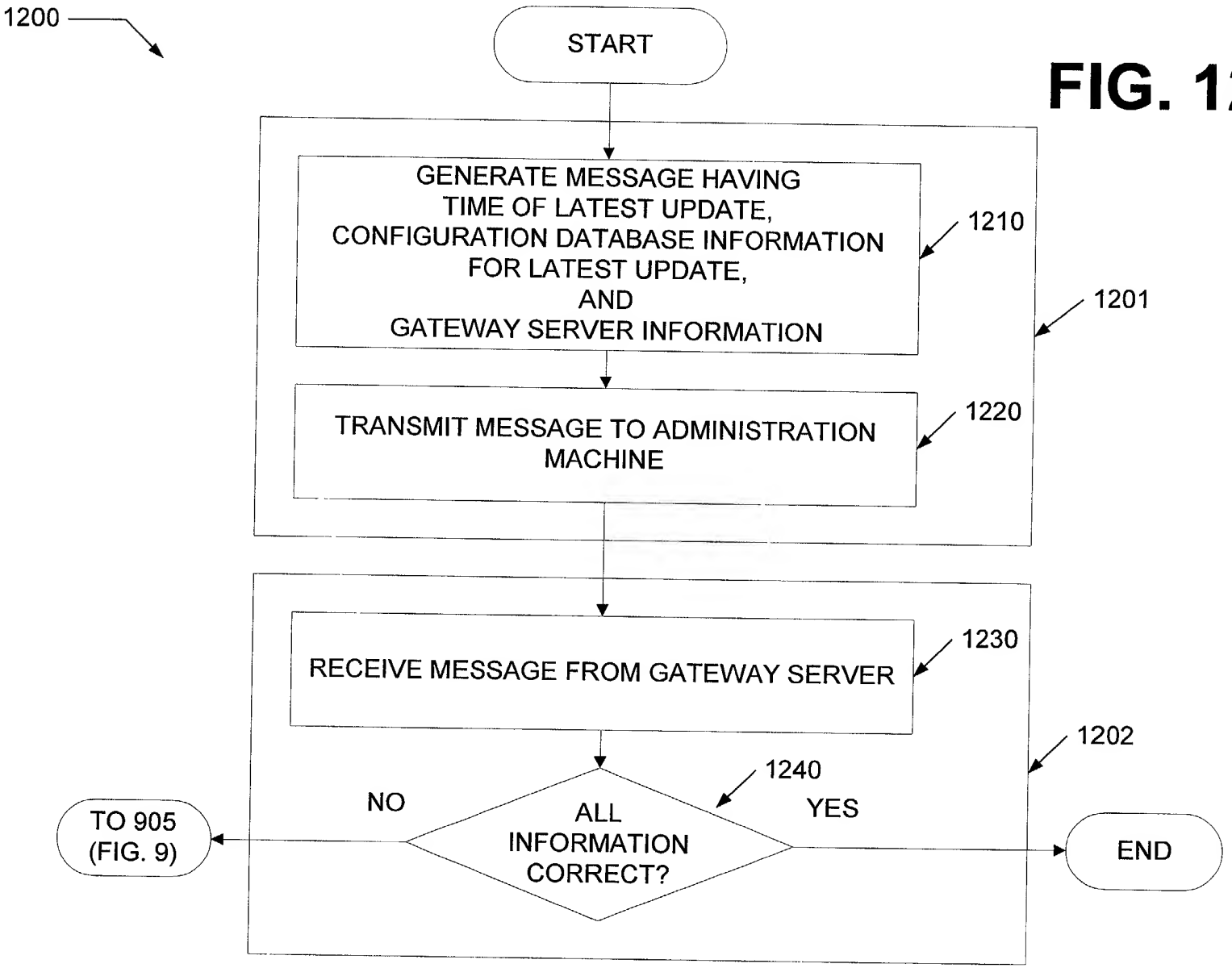


FIG. 12

DECLARATION FOR PATENT APPLICATION

Attorney Docket No: **191406-1010**

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled _____, the specification of which:

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim the benefit under Title 35, United States Code, §119 of any United States provisional patent application, foreign application(s) for patent or inventor's certificate listed below and have also identified below any United States provisional patent application, foreign application for patent or inventor's certificate having a filing date before that of the above-identified application on which priority is claimed: **U.S. Provisional Patent Serial No. 60/211,399, filed June 14, 2000.**

I hereby claim the benefit under Title 35, United States Code, §120 of any United States patent application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application: **NOT APPLICABLE.**

I hereby appoint the following attorneys/agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: **George M. Thomas, Reg. No. 22,260; James W. Kayden, Reg. No. 31,532; Scott A. Horstemeyer, Reg. No. 34,183; Stephen R. Risley, Reg. No. 35,659; Jeffrey R. Kuester, Reg. No. 34,367; Daniel J. Santos, Reg. No. 40,158; Michael J. Tempel, Reg. No. 41,344; Daniel R. McClure, Reg. No. 38,962; Robert E. Stachler II, Reg. No. 36,934; David P. Kelley, Reg. No. 17,420; Reg. No. 41,344; David R. Risley, Reg. No. 39,345; Jon E. Holland, Reg. No. 41,077; Dan R. Gresham, Reg. No 41,805; J. Scott Culpepper, Reg. No. 41,692; M. Paul Qualey, Reg. No 43,024; Robert P. Biddle, Reg. No. 35,826; Robert A. Blaha, Reg. No. 43,502; Jennifer M. Gruber, Reg. No. 42,601; Raymond W. Armentrout, Reg. No. 45,866; Cynthia J. Lee, Reg. No. 46,033; N. Andrew Crain, Reg. No. 45,442; Monica H. Winghart, Reg. No. 46,790; Sami O. Malas, Reg. No. 44,893; Marianne H. Parker, Reg. No. 46,169; Eric M. Ringer, Reg. No. 47,028**

I hereby declare under penalty of perjury under the laws of the United States of America that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true and correct; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor's Signature:_____ Date:_____

(FIRST of THREE Inventors)

Full Name of Inventor: **Daniel Guy Stephens, Jr.**

Residence: **1845 Nebraska Avenue, NE** Citizenship: **US**

St. Petersburg, Florida

Post Office Address: **1845 Nebraska Avenue, NE**

St. Petersburg, Florida

TWO Additional Separate Declarations Attached.

declar_stephens

DECLARATION FOR PATENT APPLICATION

Attorney Docket No: **191406-1010**

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled _____, the specification of which:

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____.

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Inventor's Signature:_____ Date:_____

(SECOND of THREE Inventors)

Full Name of Inventor: **Edwin Powali**

Residence: **16217 Sawgrass Circle** Citizenship: **US**

Hillsbough, Colorado

Post Office Address: **16217 Sawgrass Circle**

Hillsbough, Colorado

TWO Additional Separate Declarations Attached.

declar_powali

DECLARATION FOR PATENT APPLICATION

Attorney Docket No: **191406-1010**

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled _____, the specification of which:

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____.

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I hereby claim the benefit under Title 35, United States Code, §120 of any United States patent application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application: **NOT APPLICABLE.**

I hereby appoint the following attorneys/agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: **George M. Thomas, Reg. No. 22,260; James W. Kayden, Reg. No. 31,532; Scott A. Horstemeyer, Reg. No. 34,183; Stephen R. Risley, Reg. No. 35,659; Jeffrey R. Kuester, Reg. No. 34,367; Daniel J. Santos, Reg. No. 40,158; Michael J. Tempel, Reg. No. 41,344; Daniel R. McClure, Reg. No. 38,962; Robert E. Stachler II, Reg. No. 36,934; David P. Kelley, Reg. No. 17,420; Reg. No. 41,344; David R. Risley, Reg. No. 39,345; Jon E. Holland, Reg. No. 41,077; Dan R. Gresham, Reg. No 41,805; J. Scott Culpepper, Reg. No. 41,692; M. Paul Qualey, Reg. No 43,024; Robert P. Biddle, Reg. No. 35,826; Robert A. Blaha, Reg. No. 43,502; Jennifer M. Gruber, Reg. No. 42,601; Raymond W. Armentrout, Reg. No. 45,866; Cynthia J. Lee, Reg. No. 46,033; N. Andrew Crain, Reg. No. 45,442; Monica H. Winghart, Reg. No. 46,790; Sami O. Malas, Reg. No. 44,893; Marianne H. Parker, Reg. No. 46,169; Eric M. Ringer, Reg. No. 47,028**

I hereby declare under penalty of perjury under the laws of the United States of America that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true and correct; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor's Signature:_____ Date:_____

(THIRD of THREE Inventors)

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TWO Additional Separate Declarations Attached.

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